GETINGE

600 SERIES STEAM STERILIZERS
TECHNICAL MANUAL
61301607028 REV A US

TECHNICAL MANUAL

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3/11/08

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NOTE
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This manual is intended for qualified technicians with specialized training. If you require additional help, contact the company service representative.

WARNING
POSSIBILITY OF INJURY: Misuse of equipment or bypassing its safety features may result in personal injury.

CAUTION
POSSIBILITY OF EQUIPMENT DAMAGE: Misuse of equipment may result in equipment damage.

The 600 Series Steam Sterilizer is designed to steam sterilize hospital and laboratory goods and solutions. This equipment is NOT intended for use other than expressly stated.

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SECTION 1 PREFACE

HOW TO USE THIS MANUAL

WARNING

AVOID INJURY: Read the safety precautions in Section 2 before working on the sterilizer.

CAUTION

Maintenance and repair procedures should only be performed by service technicians and/or maintenance personnel trained on this equipment.

SUMMARY OF CONTENTS

This manual is divided into fourteen (14) sections as follows:

- Section 1, Preface—includes information regarding the intended audience, a summary of the manual's contents, advisories, and environmental impact.
- Section 2, Safety—includes important precautions and safety features.
- Section 3, Introduction—includes descriptions of the user interface and password access system, cycle information, and a functional description of the sterilizer and its options.
- Section 4, Preventive Maintenance—includes a preventive maintenance schedule and maintenance procedures. Instructions for removing panels and opening the door manually are also included.
- Section 5, Service Functions—includes instructions for navigating the menu tree and descriptions of the softkeys, menus and submenus.
- Section 6, Drawings—includes the menu tree diagram, piping and instrument diagram (P&ID), process phase descriptions, wiring diagrams and roughing-in drawings.
- Section 7, Component Locations—includes component location drawings and a recommended spare parts list.
- Section 8, Trouble Analysis—includes a description of fault indications, diagnostic messages, and trouble analysis charts.
- Section 9, Calibration and Adjustments—includes procedures for calibrating the analog input circuits, and adjusting the control system, piping system, and door.
- Section 10, Repair and Replacement—includes procedures for repairing and replacing sterilizer components.
- Appendix A, Cycle Worksheets—includes worksheets for planning cycles.
- Appendix B, System and User Flags—includes descriptions of the system and user flags.

- Appendix C, Tools and Materials—includes specifications and part numbers for specialized tools required to maintain the sterilizer.
- Appendix D, Parameter Check Graphs—provides a graphical explanation of the parameter check concept.

INTENDED AUDIENCE

These instructions are intended for the technicians who maintain and repair Getinge 600 Series Steam Sterilizers.

Before working on the sterilizer, maintenance and service personnel should thoroughly familiarize themselves with the design, operation, and safety features.

RELATED PUBLICATIONS

The following documentation is supplied with the sterilizer:

Manual	633HC	633LS
Installation Manual	61301607027	
User Manual	61301607026	61301607502
Quick Reference Poster	61301607268	61301607503
Technical Manual	61301607028	
Parts Catalog	61301607029	

NOTE
Getinge reserves the right to make changes to specifications and equipment without prior notice. The information contained within this manual is current as of the date of issue.

ENVIRONMENTAL IMPACT ASSESSMENT

The 600 Series Steam Sterilizers consist of stainless steel, copper, and electronic and electrical components which can be recycled at the end of the sterilizer life cycle. The sterilizer also contains plastic and batteries which can NOT be recycled and should be disposed of in accordance with local and federal regulations.

MANUAL CONVENTIONS

Before you begin using this manual, it is important to understand the conventions used. These conventions are established for ease of use.

ITALIC CAPS	Display text, such as the *ENTER PASSWORD* prompt.
[ALL CAPS]	Softkeys on the control panel, such as [CANCEL] or [OK].
ALL CAPS	Switches and indicators on the control panel, such as ENTER.
>	The > symbol leads you through nested menu items and dialog box options to a final action, For example, PARAMETERS > enter password > EDIT.

PARAMETER SETTINGS
ACCESS REQUIRED

The lock icon is an alert that a password with appropriate access rights is necessary to proceed.

SYMBOLS USED IN THIS MANUAL

The following symbols with related notes appear in this manual:

WARNING
"Warning" notes alert the user to the possibility of personal injury.

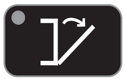
CAUTION
"Caution" notes alert the user to the possibility of damage to the equipment.

NOTE
"Notes" alert the user to pertinent facts and conditions.

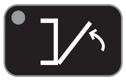
DESCRIPTION OF SYMBOLS ON THE EQUIPMENT

SWITCHES

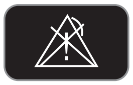
The following symbols and definitions represent the switches, indicators, and labels found on the unit.



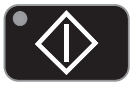
Open Door



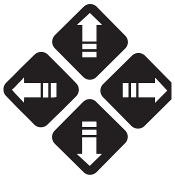
Close Door



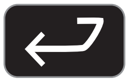
Clear Alarm



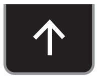
Start



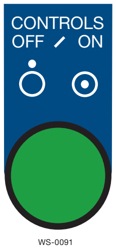
Directional Arrows (for navigating display screens)



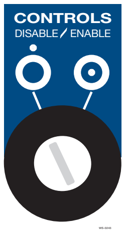
Enter



Up Arrows (for selecting softkey options such as Save, Cancel, or OK).

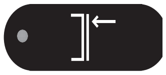

CONTROLS
OFF / ON
WS-0091

CONTROLS ON/OFF

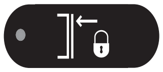

CONTROLS
DISABLE / ENABLE

CONTROLS DISABLE/ENABLE

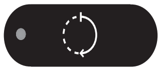
INDICATORS



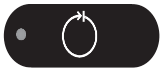
Door(s) Closed



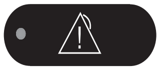
Door(s) Sealed



In Process



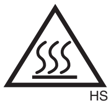
Process Complete



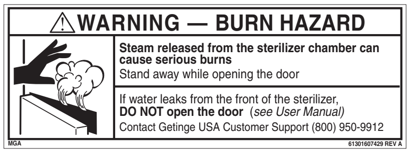
Process Failure

LABELS

The following labels on the sterilizer alert personnel to possible hazards:



Hot surfaces or heat-emitting area. Avoid contact. Risk of burns.



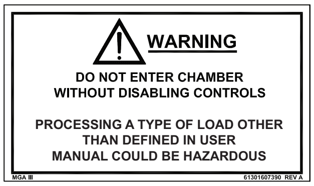
⚠WARNING — BURN HAZARD

Steam released from the sterilizer chamber can cause serious burns
Stand away while opening the door

If water leaks from the front of the sterilizer,
DO NOT open the door (*see User Manual)*
Contact Getinge USA Customer Support (800) 950-9912

MGA 61301607429 REV A

WARNING—BURN HAZARD: Steam released from the sterilizer chamber can cause serious burns. Stand away when opening door.



⚠ WARNING

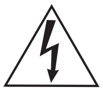
**DO NOT ENTER CHAMBER
WITHOUT DISABLING CONTROLS**

**PROCESSING A TYPE OF LOAD OTHER
THAN DEFINED IN USER
MANUAL COULD BE HAZARDOUS**

MGA III 61301607390 REV A

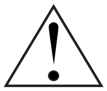
WARNING: Do not enter chamber without disabling controls. Processing a type of load other than defined in the User Manual could be hazardous.

The following labels on the Control Box and Power Box alert service personnel to possible hazards:

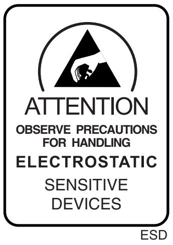


HIGH VOLTAGE

CAUTION: To reduce the risk of electrical shock, do not remove cover. Refer servicing to qualified service personnel.



ATTENTION: Refer to accompanying documents for further information.



ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

ESD

Electrostatic Sensitive Devices

SECTION 2   SAFETY

SAFETY PRECAUTIONS

The 600 Series Steam Sterilizers are designed to sterilizer and dry (where applicable) typical health care and laboratory goods. The sterilizers will include pressure pulse gravity steam, pressure vacuum pulsing, and liquids cycles. These sterilizers are NOT intended for use other than expressly stated.

The sterilizers are designed with a number of built-in safety devices. To avoid injury, it is very important that these safety devices are not bypassed and/or disabled.

WARNING
BURN HAZARD: Turn OFF and lock out/tag out the steam and hot water supplies before servicing the sterilizer. Allow the steam to dissipate and let the sterilizer cool down before touching any piping or surfaces.

SHOCK HAZARD: Turn OFF electrical power and lock out/tag out the mains disconnect before servicing the sterilizer.

SHOCK HAZARD: To disconnect all power, turn OFF the sterilizer at the mains circuit breaker. The CONTROLS ON/OFF switch does not remove primary power from the sterilizer.

CAUTION
Follow the instructions in this manual to ensure the safe and efficient performance of the sterilizer. Failure to comply with these instructions or to provide specific services could void the warranty.

AUTHORIZED PERSONNEL ONLY

- Read all instructions thoroughly before installation.
- Installation and service work must be performed by qualified personnel trained on this sterilizer.
- The sterilizer must be operated by personnel who are knowledgeable about the sterilizer operation and are trained on its use.
- Personnel must receive regular periodic training on the operation and maintenance of this equipment in accordance with established procedures for the workplace.

HOT SURFACES AND PIPES

- There are hot surfaces in the service area. Never touch any piping that could contain steam.
- The sterilizer uses hot water and steam which have the potential of causing burns or serious injuries. Wear personal protective equipment suitable for hot water and steam.

ELECTRICAL SAFETY

- The front panels and electrical enclosures may only be opened by authorized and trained personnel. Be sure to switch OFF the electric power before opening front panels and any electrical enclosures. The components contain the following voltages:
  - Control Box: 24 Vac
  - Power Box: 115 Vac
  - Steam Boiler: 208, 240, 480, or 600 Vac, Three-Phase
- The sterilizer must be connected in accordance with the installation instructions and local safety codes.
- Before welding begins on or close to the sterilizer, all wiring connected by plugs and sockets must be disconnected from all circuit boards of the control system.

LOCKOUT

- Always keep the door to the service area locked.
- No personnel should be in the service area while the sterilizer is running.
- Never bypass the door limit switches of the sterilizer.
- When servicing the unit, CONTROLS DISABLE/ENABLE should be set to DISABLE. Remove the key and keep it with you.

OTHER CONSIDERATIONS

- Leakage in the system, due to a worn door seal for example, must be repaired without delay.
- The sterilizer must be kept clean to ensure optimum performance.
- Do not hose down the outside of the sterilizer with water.

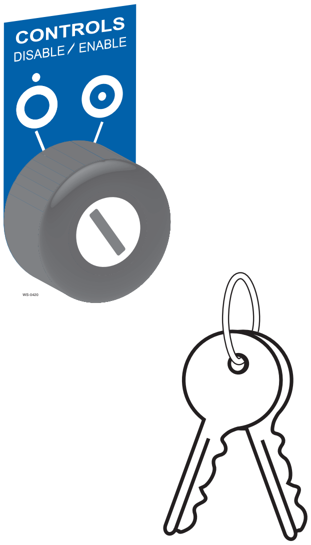
NOTE
The maximum sound pressure level of the equipment that the operator is exposed to does not exceed 85 dBA.

SAFETY FEATURES

DOOR LOCKOUT

The door can be locked in the open position for maintenance when inside the chamber. Turn the key to DISABLE and remove it. To prevent someone from closing the door during maintenance, keep the keys with you.

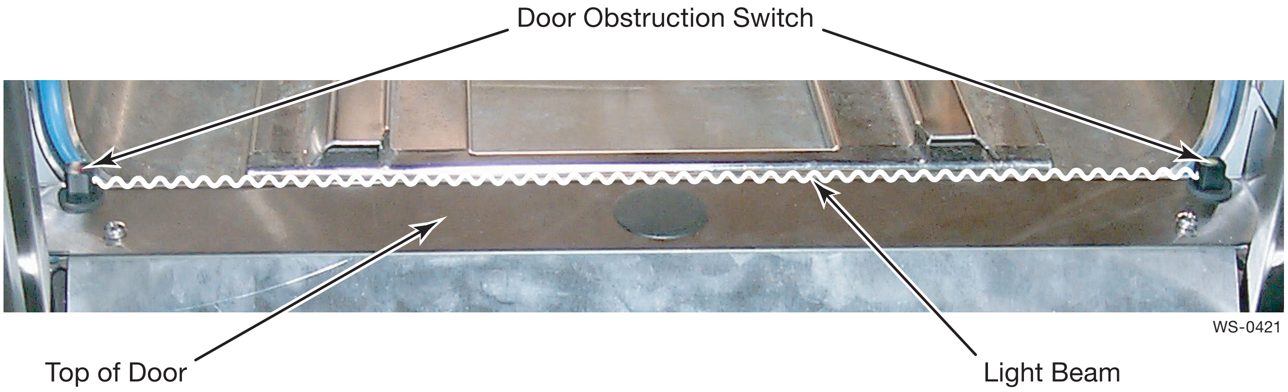
FIGURE 2–1. LOCKING THE DOOR IN THE OPEN POSITION


CONTROLS
DISABLE / ENABLE

DOOR OBSTRUCTION SWITCH

The sterilizer uses a light beam switch at the top of the door to sense when an object is in the path of the movement of the door. When the light beam is broken as the door is closing, the door stops.

FIGURE 2–2. DOOR OBSTRUCTION SWITCH

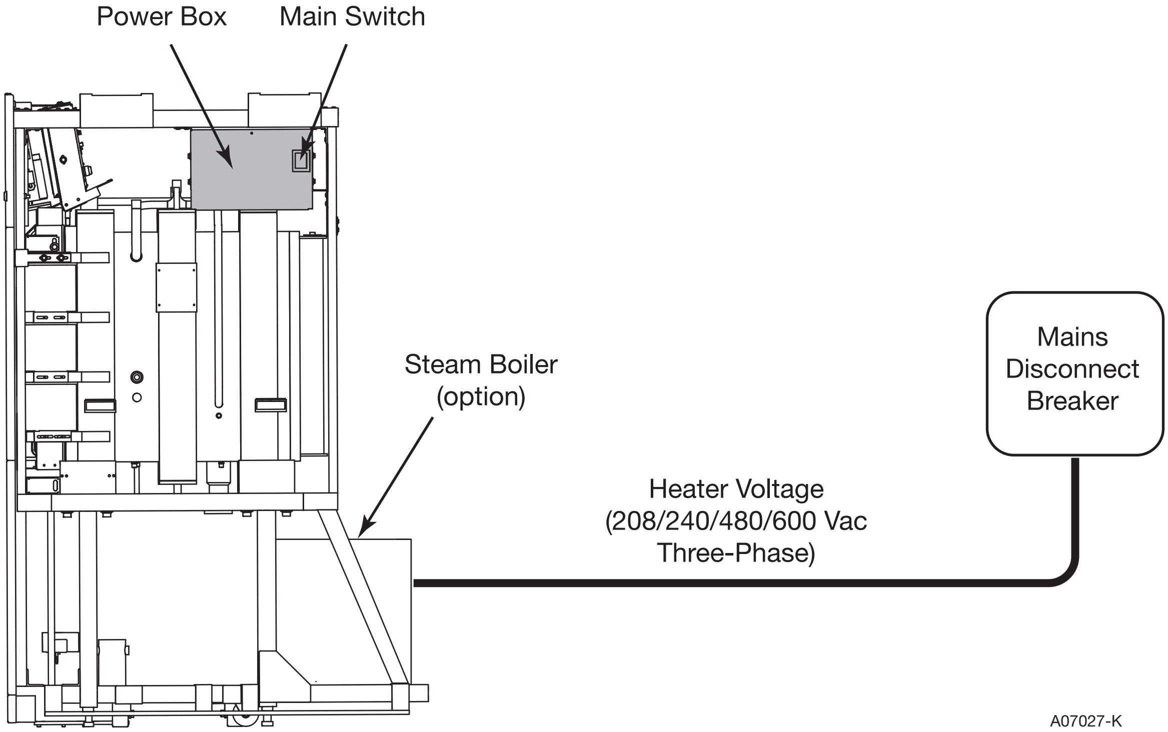

Door Obstruction Switch
WS-0421
Top of Door
Light Beam

ISOLATING DEVICE

POWER BOX

The sterilizer is fitted with a main switch on the Power Box. The box is located on the right side of the sterilizer.

FIGURE 2–3. CIRCUIT BREAKER LOCATION


Power Box
Main Switch
Steam Boiler (option)
Mains Disconnect Breaker
Heater Voltage (208/240/480/600 Vac Three-Phase)
A07027-K

NOTE
The CONTROLS ON/OFF switch on the front panel enables/disables the Controls ON (DI 09) input to the sterilizer controls. It does not turn off the 24 Vac supply to the Control Box.

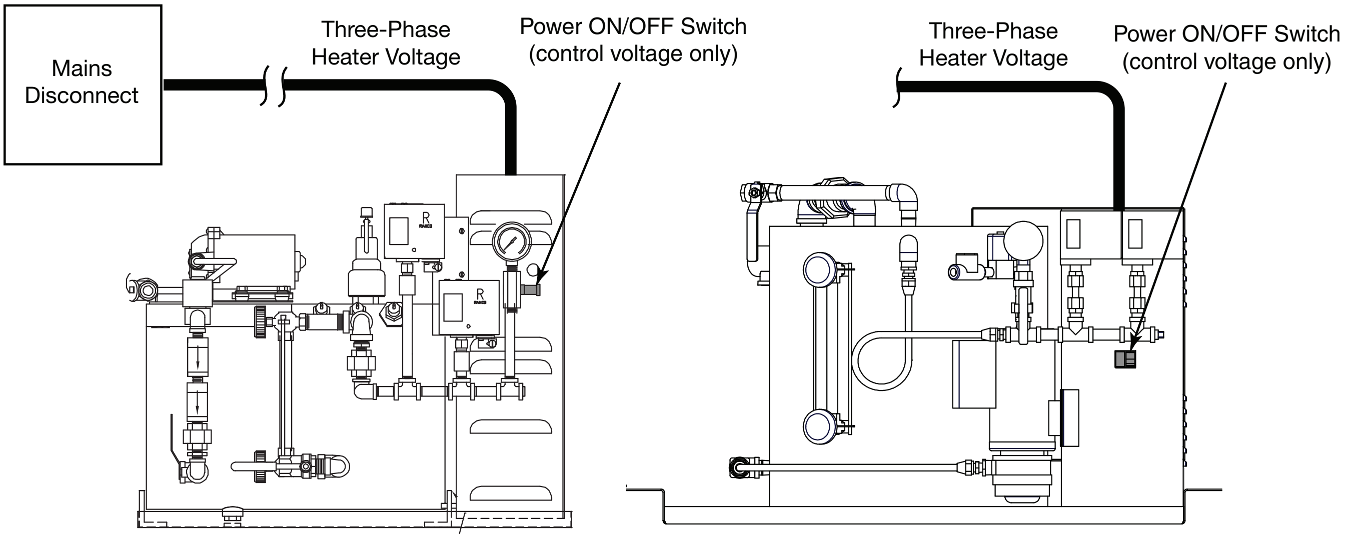
The CONTROLS DISABLE/ENABLE key switch breaks/makes the 24 Vac supply from the Power Box to the Control Box.

STEAM BOILER

GTS-30A and CAS-45A Steam Boilers are heated by a three-phase circuit that requires a separate mains disconnect. The boiler has its own power switch that controls the 120 Vac supply (from the power box) used by the boiler control circuits.

WARNING
SHOCK HAZARD: Turn OFF and lock out/tag out the three-phase power at the mains disconnect before servicing the boiler. The Power ON/OFF switch only removes the 120 Vac power from the boiler control circuits. If the mains disconnect is ON, three-phase voltage is still present on the terminal block and heater contactors inside the boiler electrical cabinet.

FIGURE 2–4. STEAM BOILER POWER SWITCH


Mains Disconnect
Three-Phase Heater Voltage
Power ON/OFF Switch (control voltage only)
Three-Phase Heater Voltage
Power ON/OFF Switch (control voltage only)
A07028-A

GTS-30A Steam Boiler
(26” length units)

CAS-45A Steam Boiler
(39” and 51” length units)

PRODUCT LIABILITY

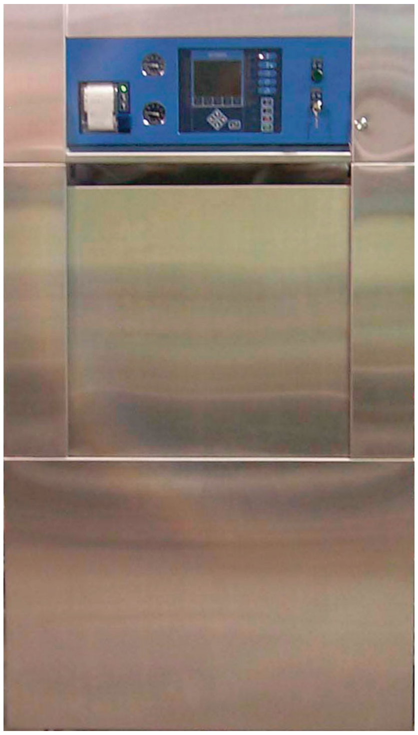
Modifications to the equipment without the express approval of the manufacturer, or incorrect use of the unit will invalidate the manufacturer’s product liability.

SECTION 3 INTRODUCTION

MODELS AND CONFIGURATIONS

The 600 Series Steam Sterilizers, shown in Figure 3–1 are medium-sized units with a 26 inch (660 mm) wide by 26 inch (660 mm) high chamber. The 600 Series sterilizers are equipped with a power-operated vertically-sliding door.

FIGURE 3–1. 600 SERIES STEAM STERILIZER



A07026-A

MODEL 633HC

The 633HC Steam Sterilizer is designed to steam-sterilize hospital goods that are heat and moisture stable. Typical load types include:

- non-porous hard goods including: instruments, basins, cups, tools, test tubes, and glassware.
- wrapped/unwrapped porous goods including: cloth, towels, gowns, and sheets.
- wrapped porous goods including: instruments, basins, and tools.
- non-flammable/non-volatile liquids in self-venting or open containers.

WARNING
The liquids cycle is not intended for sterilization of liquids intended for patient contact.

MODEL 633LS

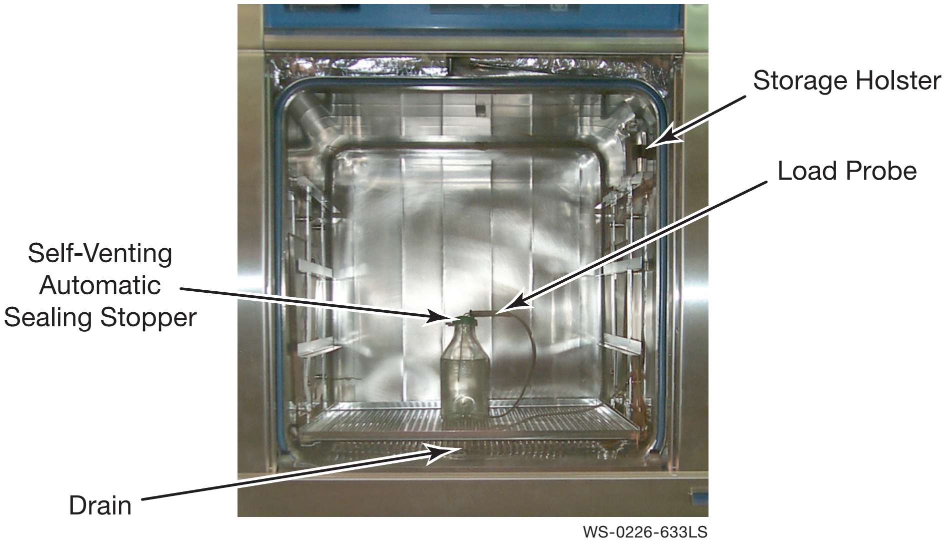
The 633LS Steam Sterilizer is designed to steam-sterilize laboratory goods that are heat and moisture stable. Typical load types include:

- non-porous hard goods including: instruments, basins, cups, tools, test tubes, glassware
- wrapped/unwrapped porous goods including: cloth, towels, gowns, sheets
- wrapped porous goods including: instruments, basins, and tools
- non-flammable/non-volatile liquids in self-venting or open containers.

WARNING
The liquids cycle is not intended for sterilization of liquids intended for patient contact.

The 633LS may be equipped with the load probe option, which monitors the temperature of a liquid load. The use of a load probe allows the exposure phase of a liquids cycle to be based on F_0 (F sub zero) or time at exposure temperature. Use of the load probe is shown in Figure 3–2.

FIGURE 3–2. LOAD PROBE PLACEMENT



FEATURE COMPARISON

The 633HC sterilizer is designed for ease-of-use with pre-programmed cycles for various applications, including a Bowie and Dick test cycle. A password is not required to run cycles; supervisor-level password is required to change cycle parameters.

The 633LS sterilizer is designed for maximum flexibility. The 633LS cycles have more user-adjustable parameters which allow the customer to fine tune the sterilization process to their needs.

Table 3–1 provides a detailed comparison of the features of each model.

TABLE 3–1. 600 SERIES FEATURE COMPARISON

Feature	633HC	633LS
Number and Type of Cycles	21 Cycles: • (9) prevacuum • (6) gravity • (2) 3-minute flash • (2) 10-minute flash • (1) liquids • (1) leak test	19 Cycles: • (6) prevacuum • (6) gravity • (6) liquids • (1) leak test
Factory Set Cycles (see Appendix A—Cycle Worksheets) for factory settings)	Cycles: • Prevacuum 1 • Prevacuum 2 • Bowie and Dick Test • Gravity 1 • Gravity 2 • Flash 3+ • Flash 10+ • Liquids 1 • Leak Test	Cycles: • Prevacuum 1 • Gravity 1 • Liquids 1 • Leak Test

TABLE 3–1. 600 SERIES FEATURE COMPARISON

Feature	633HC	633LS
Prevacuum Cycle Parameters	Adjustable by Customer: • exposure temperature • exposure time • drying time • blowdown duration	Adjustable by Customer: • exposure temperature • exposure time • drying time • blowdown duration • parameter check value • purge time • conditioning ramp up rate • number of conditioning pulses • positive pulse adjustment (auto or manual) • positive pulse height • conditioning ramp down rate • negative pulse 1 depth • negative pulse 2 depth • vacuum drying set point
	Adjustable by Service: • purge time • number of conditioning pulses • gasket heat time • drain cooling set point • drain cooling deadband	Adjustable by Service: • gasket heat time • drain cooling set point • drain cooling deadband

TABLE 3–1. 600 SERIES FEATURE COMPARISON

Feature	633HC	633LS
Gravity Cycle Parameters	Adjustable by Customer: • exposure temperature • exposure time • drying method (vacuum or gravity) • drying time • blowdown duration	Adjustable by Customer: • exposure temperature • exposure time • drying method (vacuum or gravity) • drying time • blowdown duration • parameter check value • purge time • conditioning ramp up rate • number of conditioning pulses • positive pulse adjustment (auto or manual) • positive pulse height • conditioning ramp down rate • vacuum drying set point
	Adjustable by Service: • purge time • number of conditioning pulses • gasket heat time • drain cooling set point • drain cooling deadband	Adjustable by Service: • gasket heat time • drain cooling set point • drain cooling deadband
Flash 3+ Cycle Parameters	Adjustable by Customer: • exposure temperature • exposure time • drying method (vacuum or gravity) • drying time • blowdown duration	Not Available
	Adjustable by Service: • purge time • gasket heat time • drain cooling set point • drain cooling deadband	

TABLE 3–1. 600 SERIES FEATURE COMPARISON

Feature	633HC	633LS
Flash 10+ Cycle Parameters	Adjustable by Customer: • exposure temperature • exposure time • drying method (vacuum or gravity) • drying time • blowdown duration	Not Available
	Adjustable by Service: • purge time • number of conditioning pulses • gasket heat time • drain cooling set point • drain cooling deadband	
Liquids Cycle Parameters	Adjustable by Customer: • exposure temperature • liquid dwell time • exposure time • cooldown rate • blowdown duration	Adjustable by Customer: • exposure temperature • liquid dwell time • exposure time • cooldown rate • blowdown duration • parameter check value • purge time • exposure overdrive • F_0 value
	Adjustable by Service: • purge time • gasket heat time • drain cooling set point • drain cooling deadband	Adjustable by Service: • gasket heat time • drain cooling set point • drain cooling deadband
Leak Test Cycle	Adjustable by Customer: • blowdown duration	Adjustable by Customer: • purge time • blowdown duration
	Adjustable by Service: • purge time • gasket heat time • number of conditioning pulses • drain cooling set point • drain cooling deadband	Adjustable by Service: • number of conditioning pulses • drain cooling set point • drain cooling deadband

TABLE 3–1. 600 SERIES FEATURE COMPARISON

Feature	633HC	633LS
Exposure Timing	If exposure temperatures falls below limit, control software resets the cycle to heatup phase.	If exposure temperature falls below limit, control software pauses the exposure timer until chamber temperature is above set point.
Load Probe (Liquid RTD)	Not Available	Option
Double Door Interlock	Options: • standard (no interlock) • door close interlock	Options: • standard (no interlock) • door close interlock • door seal interlock • unidirectional doors
Water Saver	Option	Option
Vacuum Pump	Not Available	Option

VESSEL SIZES

The 600 Series sterilizers are available in three sizes.

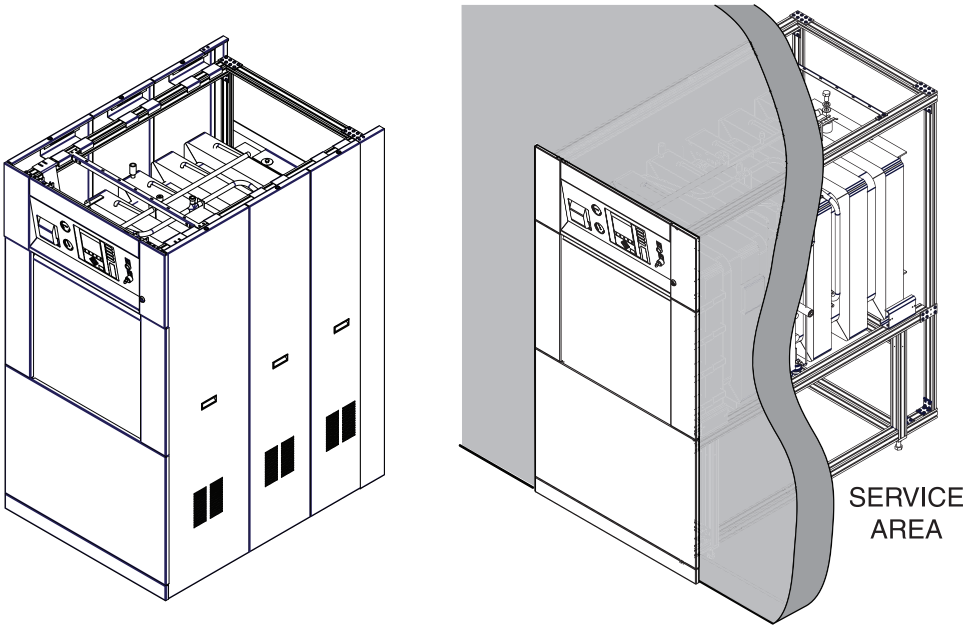
TABLE 3–2. VESSEL SIZES

HEIGHT	WIDTH	LENGTH	VOLUME
672mm (26 in.)	672mm (26 in.)	672mm (26 in.)	303L (10.7 cu ft)
		1000mm (39 in.)	452L (16.0 cu ft)
		1300mm (51 in.)	587L (20.7 cu ft)

DOOR CONFIGURATIONS

The 600 Series sterilizers are available as single door or double door units. Single door units may be freestanding or recessed into a wall. An optional cabinet is available for freestanding units.

FIGURE 3–3. SINGLE DOOR INSTALLATION OPTIONS



Freestanding (with Cabinet)

Recessed into Wall

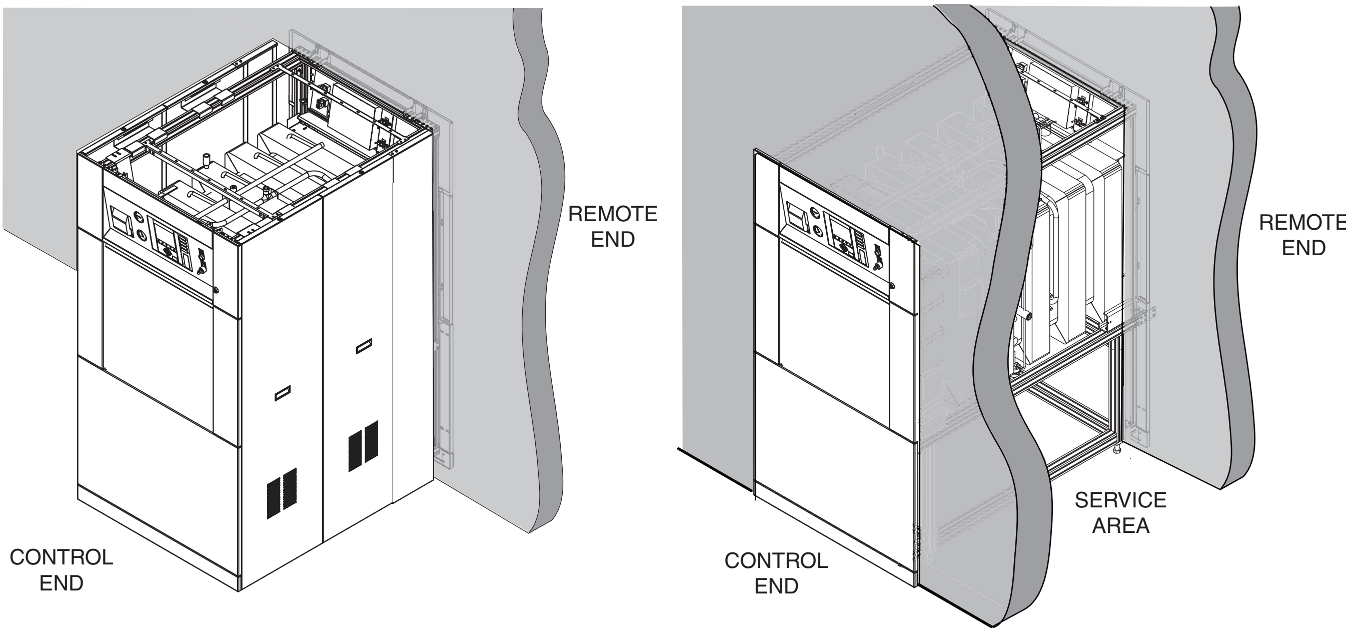
Double door units have control panels at each end. The control panel with the printer is designated as the control end (CE). The control panel on the opposite end is designated as the remote end (RE). The sterilizer is normally loaded at the control end and unloaded at the remote end.

Double door units may be recessed into the wall at one or both ends. An optional cabinet is available for double door units recessed at one end.

NOTE

The double door configuration is not available for 26 in. length units.

FIGURE 3–4. DOUBLE DOOR INSTALLATION OPTIONS



Recessed at One End (with Cabinet)

Recessed at Both Ends

On single door and standard double door units, the door(s) seal automatically when the START button is pressed, and unseal automatically at the end of a successful cycle. Double door 633HC sterilizers may be configured with a door close interlock.

Double door 633LS sterilizers may be configured for one of four interlock options: standard double door (no interlock), door close interlock, door seal interlock, or unidirectional doors. The door seal interlock and unidirectional doors configurations require modifications to the door gasket piping.

DOOR CLOSE INTERLOCK

When the sterilizer is configured for door close interlock, both doors cannot be open at the same time.

NOTE

The door close interlock option is a software feature which may be enabled or disabled by a user with Hardware Setup (H) password access.

DOOR SEAL INTERLOCK (633LS ONLY)

CAUTION

The door seal interlock is implemented by modifying both the door gasket piping and the control software. Do not attempt to change the door configuration from door closed interlock to door seal interlock or unidirectional doors.

NOTE

The door configuration may be changed from door seal interlock to unidirectional door interlock by a user with Hardware Setup (H) password access. This will enhance the biological barrier between the load end and unload end but is not a substitute for a physical barrier.

When the sterilizer is configured for door seal interlock, both doors cannot be unsealed at the same time. The remote end (RE) door unseals automatically at the end of a successful cycle, but the control end (CE) cannot be unsealed until the RE door is resealed.

UNIDIRECTIONAL DOORS (633LS ONLY)

WARNING

POSSIBILITY OF CROSS-CONTAMINATION: Disabling the unidirectional door software function will compromise the integrity of the biological barrier between the load and unload ends of the sterilizer. Getinge does not recommend changing the door configuration from unidirectional doors to door seal interlock.

CAUTION

The unidirectional door interlock is implemented by modifying both the door gasket piping and the control software. Do not disable the door seal interlock feature or attempt to reconfigure a unidirectional interlock as a door close interlock.

When the sterilizer is configured for unidirectional doors, both doors cannot be unsealed at the same time and the remote end (RE) can only be unsealed after a successful cycle. This ensures that non-sterile goods cannot be removed from the remote end.

Unidirectional doors operate as follows:

- the RE door does not unseal automatically at the end of a successful cycle.
- the CE door can only be unsealed when the RE door is sealed.
- the RE door can only be unsealed following a successful cycle (or if the RE door was the last door unsealed).
- if the CE door is sealed and the RE door is closed, the controls seal the RE door before allowing the CE door to be unsealed.
- if a cycle is aborted, the RE door cannot be unsealed until the CE door is unsealed and the operator starts another cycle.

OPERATOR INTERFACE

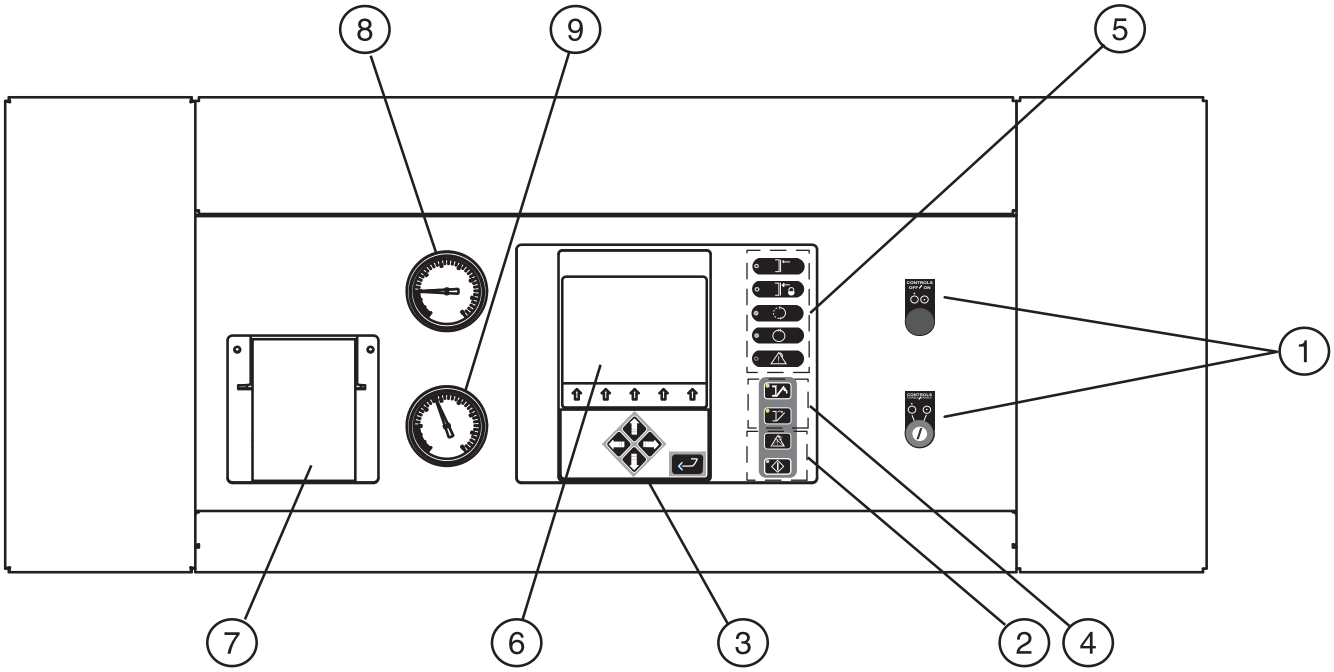
NOTE

For complete operating instructions, refer to the 633HC or 633LS User Manual.

CONTROLS AND INDICATORS

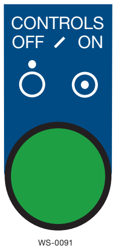
The controls and indicators on the control panel are identified in Figure 3–5.

FIGURE 3–5. CONTROL PANEL

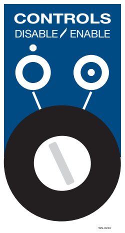


WS-0241 633HC

1. Controls:



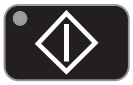
- CONTROLS ON/OFF—Turns the sterilizer controls ON and OFF. Green light indicates controls are on.



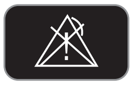
- CONTROLS DISABLE/ENABLE—Disables the sterilizer controls when the key switch is in the DISABLE position.

  Use the CONTROLS DISABLE/ENABLE switch to prevent door operation during maintenance procedures.

2. Cycle Switches:

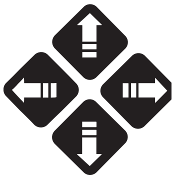


   - START—Begins the selected processing cycle.

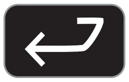


   - CLEAR/ALARM—Clears display messages and silences any alarm.

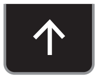
3. Programming Switches



   - Directional Arrows—Used to select the cycle, enter a password, change the adjustable cycle parameters, or navigate the menu screens.

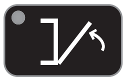


   - ENTER—Enables/stores selections in memory.

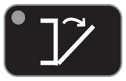


   - Softkey Select Arrows—Selects the menu option on the label above the arrow.

4. Door Switches:

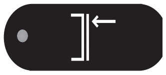


   - CLOSE DOOR—Closes the door. Press a second time to seal a closed door.

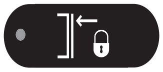


   - OPEN DOOR—Unseals the door. Press a second time to open an unsealed door.

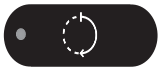
5. Status Indicators:



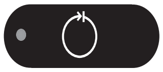
   - DOOR(S) CLOSED—Indicates the door (or both doors) is closed but not sealed.



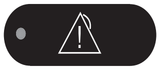
   - DOOR(S) SEALED—Indicates the door (or both doors) is sealed.



   - IN PROCESS—Indicates a cycle is in progress.



   - PROCESS COMPLETE—Green light indicates a cycle is complete (successful). Flashing red light indicates an aborted cycle.



   - PROCESS FAILURE—Flashing red light indicates that the controls automatically aborted the cycle.

6. Display Window—Displays pertinent cycle information. There are process screen options:
    - Details—see *“Selecting the Details Screen” on page 5–12*.
    - Plot Graph—see *“Selecting the Plot Graph Screen” on page 5–12*.
    - Bar Graph—see *“Selecting the Bar Graph Screen” on page 5–13*.

NOTE
For detailed instructions on the printer, see the 633HC or 633LS User Manual.

7. Printer—Provides a record of the cycle. The printer has the following controls:
    - STATUS Indicator—Blinks when the printer is out of paper, a paper jam has occurred, or the cover is open.
    - Copy Switch—Prints a duplicate of the previous cycle record. The copy function is only available when the unit is not running a cycle.
    - Paper Feed Switch—Advances the paper through the printer.
8. Jacket Pressure Gauge—Indicates the current jacket pressure in PSI.
9. Chamber Pressure Gauge—Indicates the current chamber pressure (psig) or vacuum (in. Hg).

PASSWORD ACCESS

There are four levels of password protection:

- operator
- supervisor
- service
- programmer

Each password has specific access areas that are assigned a letter code:

- A—Parameter Settings
- B—Time Settings
- C—Calibration
- D—Boolean Password 1
- E—Service
- F—Hardware Setup
- G—Configuration
- H—System Definition
- I—Boolean Code
- J—Password Setup
- K—Documentation
- L—Boolean Password 2

TABLE 3–3. PASSWORD ACCESS PRIVILEGES

Password Level	Access Areas											
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
Operator												
Supervisor	X	X					X			X		
Service	X	X	X		X	X	X			X	X	
Programmer	X	X	X	X	X	X	X	X	X	X	X	X

OPERATOR
No password is required to select and run a processing cycle, or to select the type of process screen (Details, Plot Graph, Bar Graph).

SUPERVISOR
The supervisor level password is contained in an envelope in the manual package.

NOTE
The supervisor may set up user accounts with limited access rights. For example, a user may be allowed to edit cycle parameters but not rename and resequence the cycles.

Users with a supervisor password are able to:

- edit cycle parameters (access area A).
- set the date and time (access area B).
- set up the Utilities Control and Auto Blow-Down alarm times (access area B).
- rename and resequence the cycles (access area G).
- name the sterilizer (access area G).
- configure the display panel (access area G).
- edit the extended parameters (access area G)
- set up user accounts and assign passwords (access area J).

SERVICE
The service level password is restricted to Getinge representatives and authorized service technicians.

Users with a service password are able to:

- perform all supervisor level tasks (access areas A, B, G, and J).
- calibrate the analog inputs (access area C).
- access built-in diagnostics (access area E).
- configure hardware options (access area F).
- set up the printer (access area K).

PROGRAMMER
Users with the programmer password are able to perform all supervisor and service level tasks, and modify the cycle programs (access areas D, H, I, and L). Use of the programmer password is beyond the scope of this manual.

SOFTWARE FEATURES

The following control functions may be enabled or disabled by a user with Hardware Setup (F) password access:

- door close interlock
- automatic boiler blow-down (hardware required)
- utilities control
- parameter check

DOOR CLOSE INTERLOCK

When a double door unit is configured for interlocking doors, both doors cannot be open at the same time, which prevents airborne contaminants from crossing between the decontamination and clean areas. If a door is closed, it cannot be opened unless the opposite door is closed.

On the 633HC, the Door Close Interlock feature is enabled when DIP Switches DS01 and DS03 are set to 1. See *“Configuring the Sterilizer (633HC)” on page 5–49*.

NOTE
The Door Close Interlock feature cannot be disabled on 633LS sterilizers with separate CE and RE door gasket piping (door seal interlock and unidirectional door configurations).

On the 633LS, the Door Close Interlock feature is enabled when DIP Switches DS01 and DS04 are set to 1. See *“Configuring the Sterilizer (633LS)” on page 5–51*.

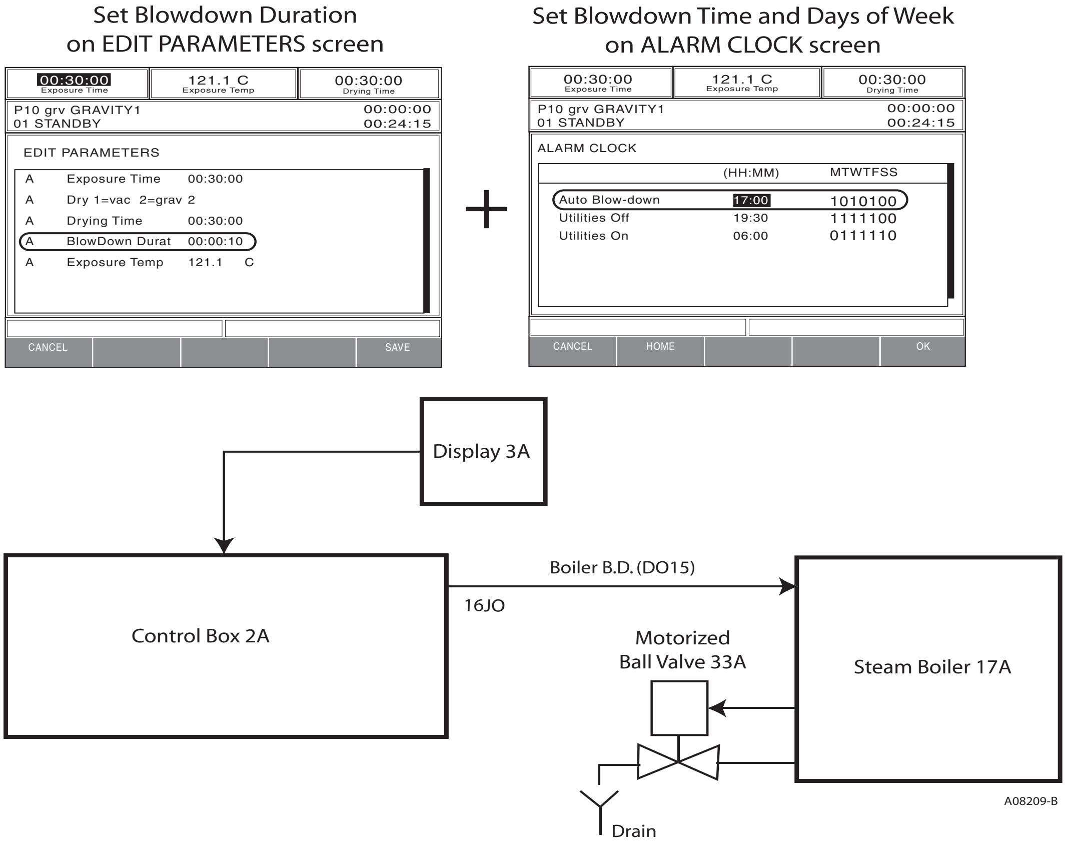
AUTOMATIC BOILER BLOW-DOWN

If the unit has a steam boiler with the automatic blow-down package installed, the Boiler Blowdown feature opens a motorized drain valve that blows down the boiler at scheduled time each day. The Boiler Blowdown event timer can be set by a user with Time Settings (B) password access. The programmable timer can be programmed for up to 7 events (e.g., the boiler can be blown down at a different time each day of the week).

The length of time the motorized drain valve is open is determined by the blowdown duration cycle parameter. When automatic blow-down is activated, the blowdown duration is determined by the setting of the currently selected cycle.

The daily blow-down time is set from the display panel (see *Figure 3–6 on page 3–19*). Auto blow-down can be activated on a day-to-day basis. The blowdown duration will be the Blow-Down Durat. parameter setting of the last cycle selected.

FIGURE 3–6. SETTING THE AUTO BLOW-DOWN TIME



Set Blowdown Duration on EDIT PARAMETERS screen

```
00:30:00          121.1 C          00:30:00
Exposure Time     Exposure Temp    Drying Time
P10 grv GRAVITY1                   00:00:00
01 STANDBY                         00:24:15

EDIT PARAMETERS
A    Exposure Time     00:30:00
A    Dry 1=vac  2=grav 2
A    Drying Time       00:30:00
A    BlowDown Durat    00:00:10
A    Exposure Temp     121.1    C

CANCEL                                 SAVE
```

Set Blowdown Time and Days of Week on ALARM CLOCK screen

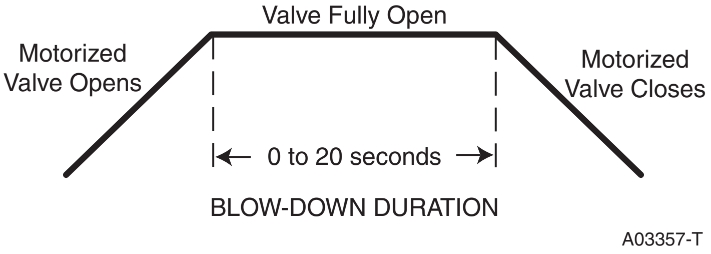
```
00:30:00          121.1 C          00:30:00
Exposure Time     Exposure Temp    Drying Time
P10 grv GRAVITY1                   00:00:00
01 STANDBY                         00:24:15

ALARM CLOCK
                    (HH:MM)    MTWTFSS
Auto Blow-down       17:00     1010100
Utilities Off        19:30     1111100
Utilities On         06:00     0111110

CANCEL     HOME                         OK
```

+
Display 3A
Control Box 2A
Boiler B.D. (DO15)
16JO
Motorized
Ball Valve 33A
Steam Boiler 17A
Drain
A08209-B

NOTE

During automatic blow-down, the control system opens the drain valve, holds the valve open for a specified time, and then closes the drain valve. The hold time (blow-down duration) may be programmed from 0 to 20 seconds by an operator with Parameter Settings access.

FIGURE 3–7. AUTOMATIC BLOW-DOWN SEQUENCE



Valve Fully Open
Motorized
Valve Opens
Motorized
Valve Closes
0 to 20 seconds
BLOW-DOWN DURATION
A03357-T

NOTE

If the hold time is set for 0 seconds, a short blow-down will still occur while the drain is opening and closing.

The Boiler Blowdown feature is enabled when DIP Switch DS07 is set to 1 (see *"Enabling the Auto Blow-Down Option" on page 5–53*).

UTILITIES CONTROL

The Utilities Control feature turns the boiler and steam supply to the sterilizer jacket on and off at a scheduled time each day. The programmable timer can be programmed for up to 14 events (e.g., the utilities can be turned on and off at a different time each day of the week).

The Utilities Control feature is enabled when DIP Switch DS08 is set to 1. See *“Enabling the Utilities Shutdown Feature” on page 5–54*.

NOTE

The Utilities Off and Utilities On event timers can be set by a user with Time Settings (B) password access.

If a cycle is in progress at the alarm time, utility shutdown will occur when the cycle ends.

The utility shutdown procedure can also be bypassed (for a single cycle) from the control panel of the sterilizer. See “Bypassing Utility Shutdown Mode” on page 5–26.

The utilities control timer does not shut off electrical power to the sterilizer.

PARAMETER CHECK

WARNING

RISK OF NON-STERILE DEVICE: This sterilizer allows the user to modify cycle settings, which may result in cycle parameters that will not achieve the desired sterility assurance level (SAL). Users with password access are responsible for validation of any cycles that use other than the factory set parameters.

The Parameter Check feature is used to verify that selected exposure time and exposure temperature settings are within an allowable range for the cycle type. This feature is intended to act as a double check and back up for the primary parameter verification performed by the supervisor.

NOTE

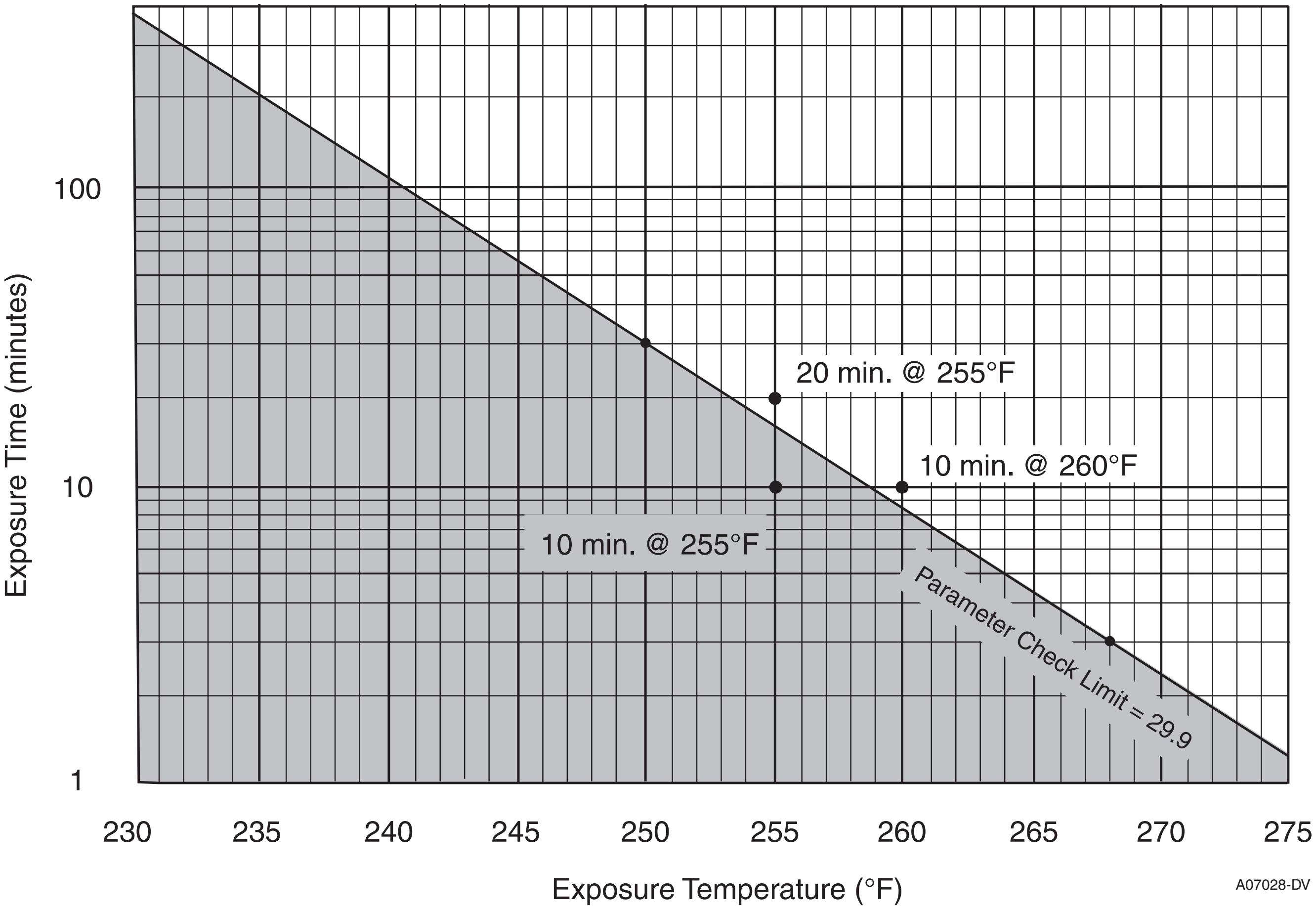
Parameter Check is not designed or intended to alleviate qualified personnel from their responsibility to select and verify that the cycle parameter selections are correct for their application.

On the 633HC, parameter check limit cannot be adjusted; on the 633LS, parameter check limit may be adjusted by a user with Parameter Settings (A) password access.

For information on selecting a parameter check limit, see Appendix D, Parameter Check Feature.

Figure 3–8 is a graph of a parameter check calculation. The cycle parameters that are below the parameter check limit are indicated by shading. For example, a 10 minute exposure at 255°F falls below the parameter check limit and will result in a *LOW CYCLE VALUES* message.

FIGURE 3–8. PARAMETER CHECK GRAPH



If a value is entered that is below the fixed Parameter Check set value, the message *LOW CYCLE VALUES* appears in red on the left side of the screen until:

- a value within the set value range is entered and saved.
- the door is actuated (reappears when door action is complete)
- the cycle is started
- another cycle is selected with settings within an allowable range for the cycle type
- *ENTER TO EDIT* appears in blue on the right side of the screen for 5 seconds.

The Parameter Check feature is enabled when DIP Switch DS11 is set to 1. See *“Enabling the Parameter Check Feature” on page 5–54*.

PROCESS DESCRIPTION (633HC)

CYCLE TYPES

The 633HC has a total of 21 programmable cycles:

TABLE 3–4. 633HC CYCLES

Cycle No. (Factory Setting)	Type	Name (Factory Setting)
P1 P2 P3 P4 P5 P6	Prevacuum	vac PREVAC 1
P7 P8		vac PREVAC 2
P9		vac B & D TEST
P10 P11 P12	Gravity	grv GRAVITY 1
P13 P14 P15		grv GRAVITY 2
P16 P17	Flash 3+	f3 FLASH 3+
P18 P19	Flash 10+	f10 FLASH 10+
P20	Liquids	liq LIQUIDS 1
P21	Vacuum Leak Test	lk LEAK TEST

NOTE

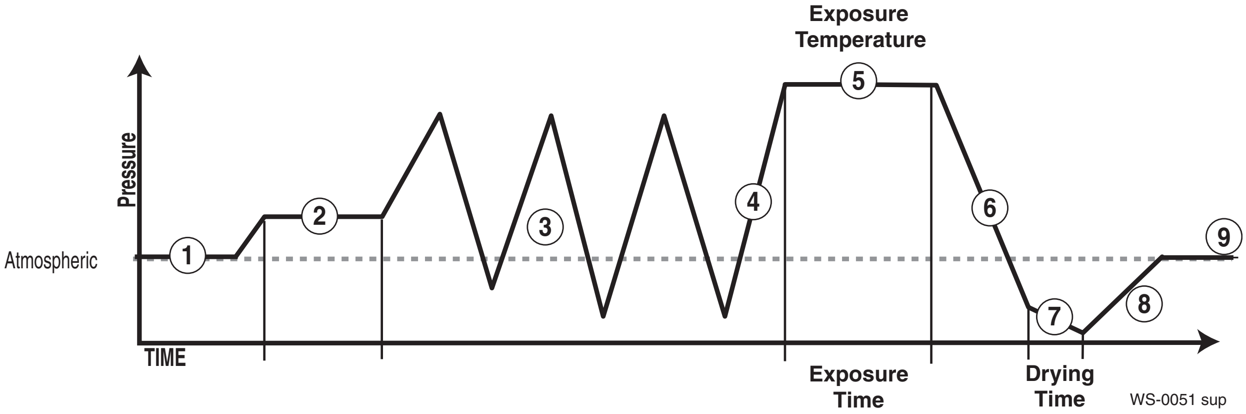
The sterilizer is shipped with the cycle numbers assigned as listed in Table 3–4. The cycle numbers can be renumbered (resequenced) by a user with Configuration (G) password access.

The cycles can be renamed by a user with Configuration (G) password access. For example, a prevacuum cycle with a 16-minute drying phase intended for processing wrapped instrument packs might be named “vac WRAP 16 DRY”. The cycle type prefixes (vac, grv, f3, f10, liq and lk) cannot be changed.

PREVACUUM CYCLE

Prevacuum cycles use pressure/vacuum pulses to remove air from the load during the conditioning phase. During the drying phase, vacuum in the chamber reduces the time required to dry the load.

FIGURE 3–9. PREVACUUM CYCLE DIAGRAM (633HC)



1. Start
2. Purge
3. Conditioning
4. Heat-up
5. Exposure
6. Exhaust
7. Drying
8. Air-in
9. Cycle Complete

NOTE

The B & D Test cycle is a prevacuum cycle with the cycle parameter values preset for processing the Bowie and Dick Test packs.

Refer to Figure 6–3, Sheet 1 on page 6–5 for a description of the cycle phases.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Exposure Time
- Dry Time
- Blowdown Durat.
- Exposure Temp

The following extended parameters can be adjusted by a user with Configuration (G) password access:

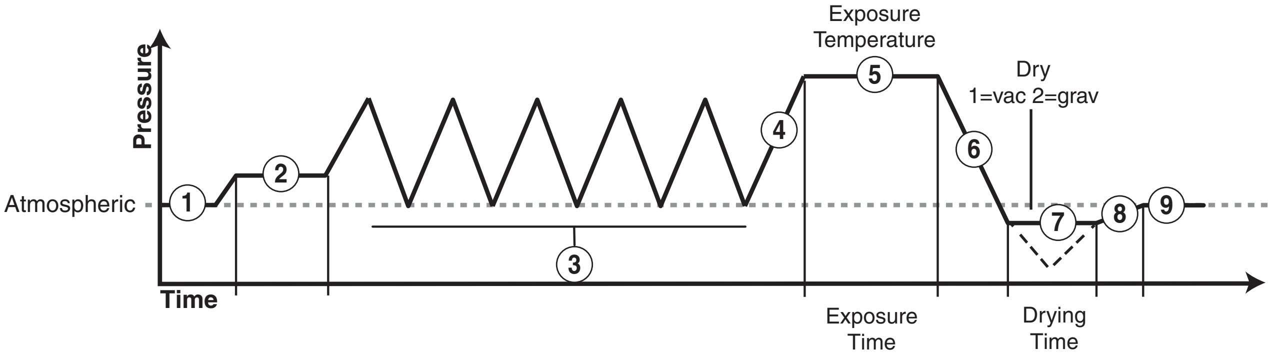
- Purge Time
- Conditioning Pul
- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

NOTE
See Table 3–5 on page 3–35 and Table 3–6 on page 3–36 for parameter definitions.

GRAVITY CYCLE

Gravity cycles use the gravity (downward displacement) method of air removal. The conditioning phase of these cycles includes pressure pulses to aid in air removal.

FIGURE 3–10. GRAVITY CYCLE DIAGRAM (633HC)



WS-0049-633HC

1. Start
2. Purge
3. Conditioning
4. Heat-up
5. Exposure
6. Exhaust
7. Drying
8. Air-in
9. Cycle Complete

☞ ***NOTE***

Gravity cycle drying time may be reduced by selecting vacuum (1=vac) drying phase. Do not select the vacuum drying phase (1=vac) if the load is vacuum sensitive.

Refer to Figure 6–3, Sheet 1 on page 6–5 for a description of the cycle phases.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Exposure Time
- Dry 1=vac,2=grav
- Dry Time
- Blowdown Durat.
- Exposure Temp

The following extended parameters can be adjusted by a user with Configuration (G) password access:

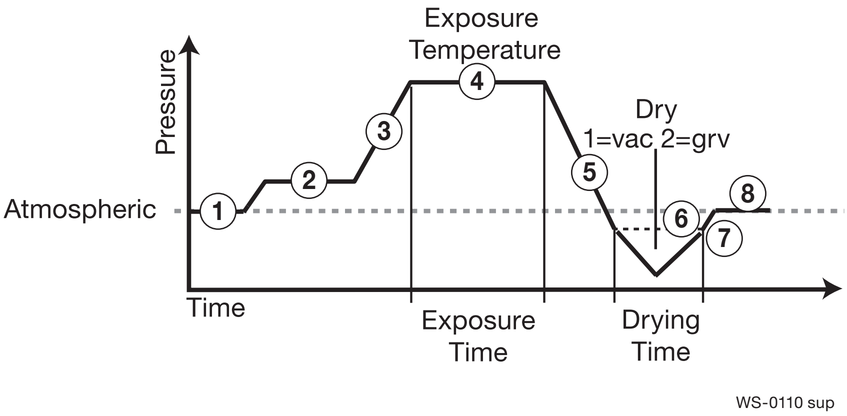
- Purge Time
- Conditioning Pul
- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

NOTE
See Table 3–5 on page 3–35 and Table 3–6 on page 3–36 for parameter definitions.

FLASH 3+ CYCLE

Flash 3+ cycles use the gravity (downward displacement) method of air removal. The conditioning phase of these cycles does not include pressure pulses to air in air removal.

FIGURE 3–11. FLASH 3+ CYCLE DIAGRAM



1. Start
2. Purge
3. Heat-up
4. Exposure
5. Exhaust
6. Drying
7. Air-in
8. Cycle Complete

NOTE

Flash 3+ cycle drying time may be reduced by selecting vacuum (1=vac) drying phase. Do not select the vacuum drying phase (1=vac) if the load is vacuum sensitive.

Refer to Figure 6–3, Sheet 1 on page 6–5 for a description of the cycle phases.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Exposure Time
- Dry 1=vac,2=grav
- Dry Time
- Blowdown Durat.
- Exposure Temp

The following extended parameters can be adjusted by a user with Configuration (G) password access:

- Purge Time
- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

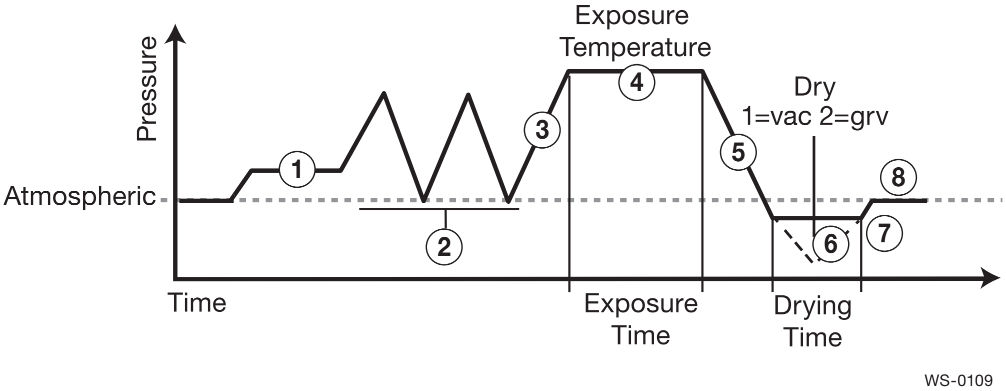
NOTE

See Table 3–5 on page 3–35 and Table 3–6 on page 3–36 for parameter definitions.

FLASH 10+ CYCLE

Flash 10+ cycles use the gravity (downward displacement) method of air removal. The conditioning phase of these cycles include two pressure pulses to aid in air removal.

FIGURE 3–12. FLASH 10+ CYCLE DIAGRAM


Exposure Temperature
Pressure
Dry
1=vac 2=grv
Atmospheric
1
2
3
4
5
6
7
8
Time
Exposure Time
Drying Time
WS-0109

1. Start
2. Purge
3. Conditioning
4. Heat-up
5. Exposure
6. Exhaust
7. Drying
8. Air-in
9. Cycle Complete

NOTE

Flash 10+ cycle drying time may be reduced by selecting vacuum (1=vac) drying phase. Do not select the vacuum drying phase (1=vac) if the load is vacuum sensitive.

Refer to Figure 6–3, Sheet 1 on page 6–5 for a description of the cycle phases.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Exposure Time
- Dry 1=vac,2=grav
- Dry Time
- Blowdown Durat.
- Exposure Temp

The following extended parameters can be adjusted by a user with Configuration (G) password access:

- Purge Time
- Conditioning Pul
- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

NOTE
See Table 3–5 on page 3–35 and Table 3–6 on page 3–36 for parameter definitions.

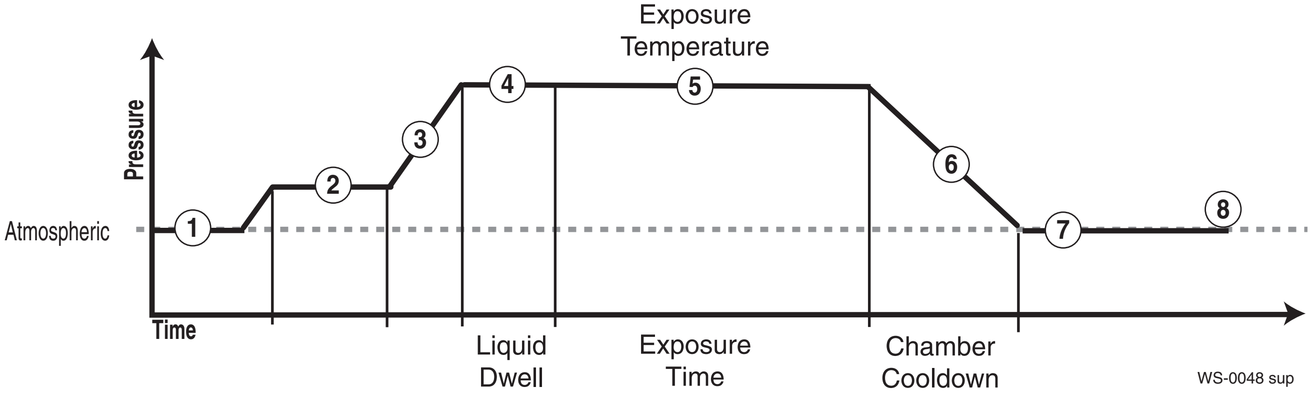
LIQUIDS CYCLE

WARNING

The liquids cycle is NOT intended for the sterilization of liquids intended for direct patient contact.

Liquids cycles use the gravity method of air removal. The liquid exhaust phase is computer-controlled.

FIGURE 3–13. LIQUIDS CYCLE DIAGRAM (633HC)



1. Start
2. Purge
3. Liquid Heat-up
4. Liquid Dwell
5. Liquid Exposure
6. Liquid Exhaust
7. Cycle Complete

NOTE

Refer to Figure 6–3, Sheet 1 on page 6–5 for a description of the cycle phases.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Exposure Temp
- Liquid Dwell Time
- Exposure Time
- Chamber Cooldown
- Blowdown Durat.

The following extended parameters can be adjusted by a user with Configuration (G) password access:

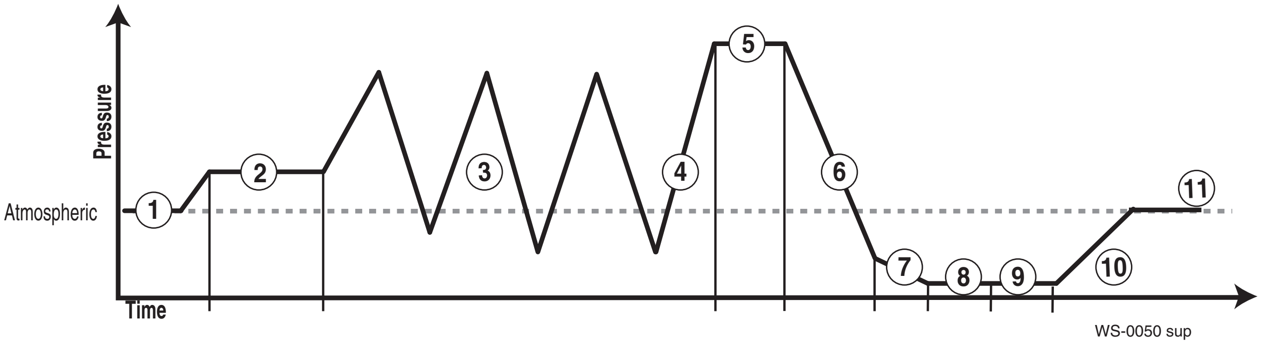
- Purge Time
- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

NOTE
See Table 3–5 on page 3–35 and Table 3–6 on page 3–36 for parameter definitions.

VACUUM LEAK TEST CYCLE

The Vacuum Leak Test cycle parameters are not adjustable, except blowdown duration.

FIGURE 3–14. VACUUM LEAK TEST DIAGRAM (633HC)



1. Start
2. Purge
3. Conditioning (3 pulses)
4. Heat-up
5. Exposure
6. Exhaust
7. Drying (vacuum)
8. Equalization
9. Leak Test
10. Air-In
11. Cycle Complete

NOTE
The leak test should be run with no load in the chamber.

Refer to Figure 6–3, Sheet 1 on page 6–5 for a description of the cycle phases.

The following cycle parameter can be adjusted by a user with Parameter Settings (A) password access:

- Blowdown Durat.

The following extended parameters can be adjusted by a user with Configuration (G) password access:

- Purge Time
- Conditioning Pul
- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

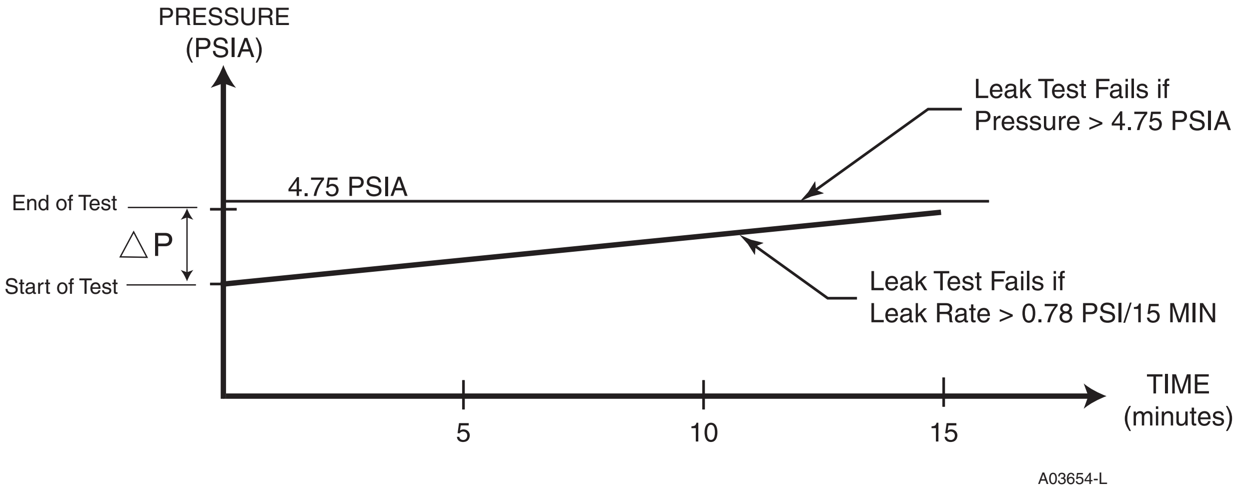
NOTE
See Table 3–5 on page 3–35 and Table 3–6 on page 3–36 for parameter definitions.

The first part of the Vacuum Leak Test cycle is similar to a Prevacuum cycle. After the drying phase is complete, there is an equalization (dwell) phase where vacuum is maintained in the chamber. At the start of the test phase, the chamber pressure is measured. After 15 minutes, the chamber pressure is measured again and the leak rate is calculated.

A *LEAK TEST FAIL* message occurs if the:

- leak rate exceeds 0.78 psi over the 15 minute test.
- chamber pressure exceeds 4.75 psia at any time during the test.

FIGURE 3–15. LEAK TEST



CYCLE PARAMETERS

FACTORY SET PARAMETERS

The factory set parameters are listed on the Cycle Worksheets in Appendix A.

ADJUSTABLE PARAMETERS

The cycle parameters that can be adjusted from the Edit Parameter screen are listed in Table 3–5. See *“Editing the Cycle Parameters (Quick Edit)” on page 5–17* or *“Editing the Cycle Parameters (Full Edit)” on page 5–18* for the procedure.

TABLE 3–5. ADJUSTABLE PARAMETERS (633HC)

Parameter	Description	Cycles
Exposure Temp	The exposure phase begins when the chamber temperature reaches the exposure temperature set point. During the exposure phase, the selected exposure temperature is maintained for the selected exposure time.	All except Vacuum Leak Test
Exposure Time	Exposure is a timed phase during which saturated steam is maintained to provide the conditions necessary to achieve sterilization. If the chamber temperature falls below the required range, the exposure timer is reset to zero (0) until the chamber temperature is within the allowed range.	All except Vacuum Leak Test
Dry 1=vac, 2=grav	The sterilizer has two user-selectable options for drying method: gravity (2=grav) and vacuum (1=vac). Selecting vacuum reduces drying time and is used with loads that are not vacuum-sensitive.	Gravity Flash 3+ Flash 10+
Dry Time	Drying is a timed phase during which heat and negative pressure (depending on dry type) are used to remove moisture from the load. The actual drying time and load size may need to be adjusted based on a variety of conditions including: • load composition • wrapping techniques • ambient conditions • quality of utilities	Prevacuum Gravity Flash 3+ Flash 10+
Chamber Cooldown	During the liquid exhaust phase, the chamber pressure is slowly reduced until the chamber temperature is below 203°F (95°C). The sterilizer controls monitor the chamber pressure and control the chamber drain valve so the chamber pressure is released at a steady rate. This slow exhaust reduces the possibility of liquids boiling over and containers from breaking, and ensures the load is cool enough to remove at the end of the cycle.	Liquids

TABLE 3–5. ADJUSTABLE PARAMETERS (633HC)

Parameter	Description	Cycles
Blowdown Durat.	On units with the automatic blow-down option, the sterilizer controls operate a motorized drain valve that blows down the steam boiler. Automatic blow-down occurs when the alarm clock is activated and the sterilizer is in standby mode. At the scheduled time, the controls open the motorized valve for 0 to 20 seconds.	All

EXTENDED PARAMETERS

The cycle parameters that can be adjusted by a user with a Configuration (G) password access are listed in Table 3–6. See *“Editing the Extended Parameters” on page 5–43* for the procedure.

TABLE 3–6. EXTENDED PARAMETERS (633HC)

Parameter	Description	Cycles
Purge Time 26"	Purge is a timed cycle during which steam flows through the chamber, displacing air and preheating the load. This parameter is available when DIP Switch DS16 is set to 1.	All Cycles
Purge Time 39"/51"	Purge is a timed cycle during which steam flows through the chamber, displacing air and preheating the load. This parameter is available when either DIP Switch DS17 or DS18 is set to 1.	All Cycles
Conditioning Pul	The number of pressure or pressure/vacuum pulses during the conditioning phase of the cycle.	All cycles except Flash 3+ and Liquids
Gasket Heat Time	If the jacket temperature falls below 212°F (100°C), the door gasket headring will be flushed for a specified time at the start of the next cycle. Steam flowing through the headring purges the air and flashes off any condensate that resulted when the jacket cooled.	All Cycles
Start Drain Cool	To comply with plumbing codes, the discharge from the sterilizer to the facility drain must not exceed 140°F (60°C). Start Drain Cool is the set point at which cooling water is added to the discharge from the sterilizer.	All Cycles
Drain Cool Diff	The deadband of the drain cooling temperature control routine. For example, if the Start Drain Cool temperature is 131°F (55°C) and the Drain Cool Diff is 9°F (5°C), the cooling water will be turned off when the drain temperature falls below 122°F (50°C).	All Cycles

PROCESS DESCRIPTION (633LS)

CYCLE TYPES

The 633LS has a total of 19 programmable cycles:

TABLE 3–7. 633LS CYCLES

Cycle No.	Type	Name
P1	Prevacuum	vac PREVAC 1
P2		
P3		
P4		
P5		
P6		
P7	Gravity	grv GRAVITY 1
P8		
P9		
P10		
P11		
P12		
P13	Liquids	liq LIQUIDS 1
P14		
P15		
P16		
P17		
P18		
P21	Vacuum Leak Test	lk LEAK TEST

A user with Configuration (G) password access can rename and renumber (resequence) the cycles. For example, a prevacuum cycle with a 16-minute drying phase intended for processing wrapped instrument packs might be named “vac WRAP 16".

NOTE

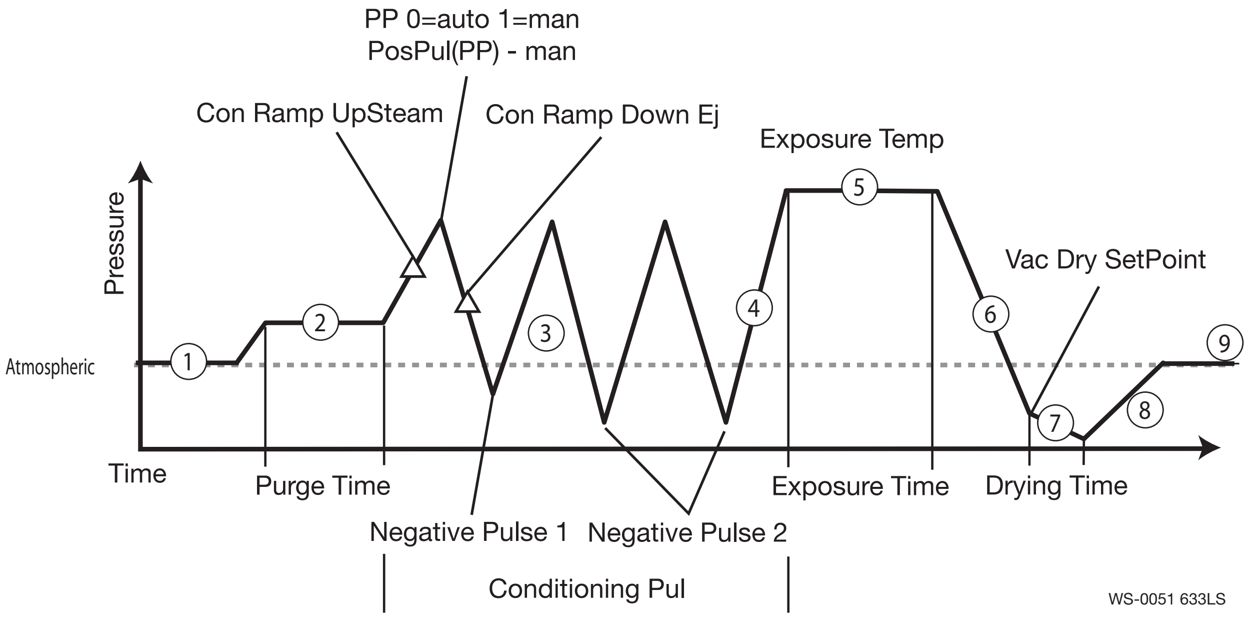
The sterilizer is shipped with the cycle numbers assigned as listed in Table 3–7. The cycle numbers can be renumbered (resequenced) by a user with Configuration (G) password access.

The cycles can be renamed by a user with Configuration (G) password access. For example, a liquids cycle with a 45-minute exposure phase might be named “liq LIQUIDS 45”. The cycle type prefixes (vac, grv, liq and lk) cannot be changed.

PREVACUUM CYCLE

Prevacuum cycles use pressure/vacuum pulses to remove air from the load during the conditioning phase. During the drying phase, vacuum in the chamber reduces the time required to dry the load.

FIGURE 3–16. PREVACUUM CYCLE DIAGRAM (633LS)


PP 0=auto 1=man
PosPul(PP) - man
Con Ramp UpSteam
Con Ramp Down Ej
Exposure Temp
Pressure
Vac Dry SetPoint
Atmospheric
1
2
3
4
5
6
7
8
9
Time
Purge Time
Exposure Time
Drying Time
Negative Pulse 1
Negative Pulse 2
Conditioning Pul
WS-0051 633LS

1. Start
2. Purge
3. Conditioning (3 pulses)
4. Heat-up
5. Exposure
6. Exhaust
7. Drying (vacuum)
8. Air-in
9. Cycle Complete

NOTE

Refer to Figure 6–4, Sheet 1 on page 6–9 for a description of the cycle phases.

Refer to the 633LS User Manual for detailed information on planning custom cycles.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Parameter Check
- Purge Time
- Con Ramp UpSteam
- Conditioning Pul
- PP 0=auto 1=man
- PosPul(PP) - man
- Con Ramp Down Ej
- Negative Pulse 1
- Negative Pulse 2
- Exposure Time
- Vac Dry SetPoint
- Dry Time
- Blowdown Durat.
- Exposure Temp

The following extended parameters can be adjusted by a user with Configuration (G) password access:

- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

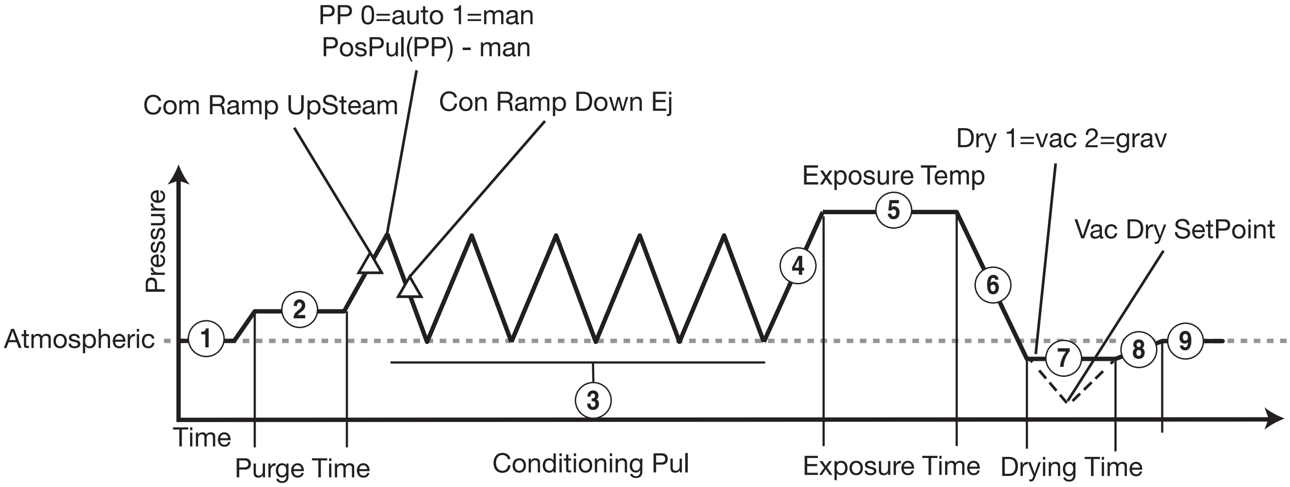
NOTE

See Table 3–8 on page 3–45 and Table 3–9 on page 3–47 for parameter definitions.

GRAVITY CYCLE

Gravity cycles use the gravity (downward displacement) method of air removal. The conditioning phase of these cycles includes pressure pulses to aid in air removal.

FIGURE 3–17. GRAVITY CYCLE DIAGRAM (633LS)


PP 0=auto 1=man
PosPul(PP) - man
Com Ramp UpSteam
Con Ramp Down Ej
Dry 1=vac 2=grav
Exposure Temp
Vac Dry SetPoint
Pressure
Atmospheric
Time
Purge Time
Conditioning Pul
Exposure Time
Drying Time
1
2
3
4
5
6
7
8
9

WS-0049 633LS

1. Start
2. Purge
3. Conditioning (3 pulses)
4. Heat-up
5. Exposure
6. Exhaust
7. Drying (vacuum or gravity)
8. Air-in
9. Cycle Complete

NOTE

Gravity cycle drying time may be reduced by selecting vacuum (1=vac) drying phase. Do not select the vacuum drying phase (1=vac) if the load is vacuum sensitive.

Refer to Figure 6–4, Sheet 1 on page 6–9 for a description of the cycle phases.

Refer to the 633LS User Manual for detailed information on planning custom cycles.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Parameter Check
- Purge Time
- Con Ramp UpSteam
- Conditioning Pul
- PP 0=auto 1=man
- PosPul(PP) - man
- Con Ramp Down Ej
- Negative Pulse 1
- Negative Pulse 2
- Exposure Time
- Vac Dry SetPoint
- Dry Time
- Blowdown Durat.
- Exposure Temp

The following extended parameters can be adjusted by a user with Configuration (G) password access:

- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

NOTE

See Table 3–8 on page 3–45 and Table 3–9 on page 3–47 for parameter definitions.

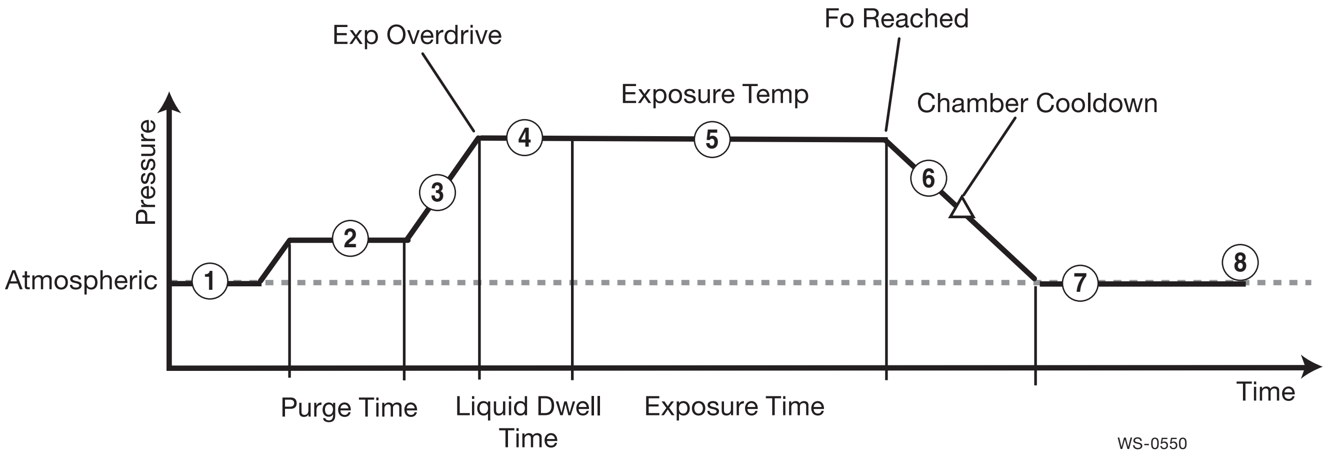
LIQUIDS CYCLE

WARNING

The liquids cycle is NOT intended for the sterilization of liquids intended for direct patient contact.

Liquids cycles use the gravity method of air removal. The liquid exhaust phase is computer-controlled.

FIGURE 3–18. LIQUIDS CYCLE DIAGRAM (633LS)


Exp Overdrive
Fo Reached
Exposure Temp
Chamber Cooldown
Pressure
Atmospheric
1
2
3
4
5
6
7
8
Purge Time
Liquid Dwell Time
Exposure Time
Time
WS-0550

1. Start
2. Purge
3. Liquid Heat-up
4. Liquid Dwell
5. Liquid Exposure
6. Liquid Exhaust
7. Cycle Complete

NOTE

Refer to Figure 6–4, Sheet 1 on page 6–9 for a description of the cycle phases.

Refer to the 633LS User Manual for detailed information on planning custom cycles.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Parameter Check
- Purge Time
- Exposure Temp
- Exp Overdrive
- Liquid Dwell time
- Exposure Time
- Fo Value Reached
- Chamber Cooldown
- Blowdown Durat.

The following extended parameters can be adjusted by a user with Configuration (G) password access:

- Gasket Heat Time
- Start Drain Cool
- Drain Cool Diff

NOTE
See Table 3–8 on page 3–45 and Table 3–9 on page 3–47 for parameter definitions.

VACUUM LEAK TEST CYCLE

See *“Vacuum Leak Test Cycle” on page 3–33* for a description of the vacuum leak test.

The following cycle parameters can be adjusted by a user with Parameter Settings (A) password access:

- Purge Time
- Blowdown Durat.

The following extended parameters can be adjusted by a user with Configuration (G) password access:

- Conditioning Pul
- Start Drain Cool
- Drain Cool Diff

NOTE

Refer to the 633LS Process Phase Diagram on page 6–9 for a description of the cycle phases.

Refer to the 633LS User Manual for detailed information on planning custom cycles.

See Table 3–8 on page 3–45 and Table 3–9 on page 3–47 for parameter definitions.

CYCLE PARAMETERS

FACTORY SET PARAMETERS

The factory set parameters are listed on the Cycle Worksheets in Appendix A.

ADJUSTABLE PARAMETERS

The cycle parameters that can be adjusted from the Edit Parameter screen access are listed in Table 3–5. See *“Editing the Cycle Parameters (Quick Edit)” on page 5–17* or *“Editing the Cycle Parameters (Full Edit)” on page 5–18*. for the procedure.

TABLE 3–8. ADJUSTABLE PARAMETERS (633LS)

Parameter	Description	Cycles
Exposure Temp	The exposure phase begins when the chamber temperature reaches the exposure temperature setpoint. During the exposure phase, the selected exposure temperature is maintained for the selected exposure time.	Prevacuum Gravity Liquids
Exposure Time	Exposure is a timed phase during which saturated steam is maintained to provide the conditions necessary to achieve sterilization. If the chamber temperature falls below the required range, the exposure timer is paused until the chamber temperature is within the allowed range.	Prevacuum Gravity Liquids
Dry 1=vac, 2=grav	The sterilizer has two user-selectable options for drying method: gravity (2=grav) and vacuum (1=vac). Selecting vacuum reduces drying time and is used with loads that are not vacuum-sensitive.	Gravity
Dry Time	Drying is a timed phase during which heat and negative pressure (depending on dry type) are used to remove moisture from the load. The actual drying time and load size may need to be adjusted based on a variety of conditions including: • load composition • wrapping techniques • ambient conditions • quality of utilities	Prevacuum Gravity
Chamber Cooldown	During the liquid exhaust phase, the chamber pressure is slowly reduced until the chamber temperature is below 95°C (203°F). The sterilizer controls monitor the chamber pressure and control the chamber drain valve so the chamber pressure is released at a steady rate. This slow exhaust reduces the possibility of liquids boiling over and containers from breaking, and ensures the load is cool enough to remove at the end of the cycle.	Liquids

TABLE 3–8. ADJUSTABLE PARAMETERS (633LS)

Parameter	Description	Cycles
Blowdown Durat.	On units with the automatic blow-down option, the sterilizer controls operate a motorized drain valve that blows down the steam boiler. Automatic blow-down occurs when the alarm clock is activated and the sterilizer is in standby mode. At the scheduled time, the controls open the motorized valve for 0 to 20 seconds.	All
Parameter Check LI	Verification that the exposure time and exposure temperature settings are within an allowable range for the cycle type	Prevacuum Gravity Liquids
Purge Time	The period of time the sterilizer is in the purge phase. This is a timed phase during which steam flows through the chamber, displacing air and preheating the load.	All
Con Ramp Up/Steam	The rate of pressurization during the positive pulse subphase.	Prevacuum Gravity
Conditioning Pul	The number of conditioning pulses.	Prevacuum Gravity
PP 0=auto 1=man	The maximum pressure of the positive conditioning pulses is controlled by an algorithm (auto) or set by the operator (man).	Prevacuum Gravity
PosPul (PP) - man	The maximum pressure of the positive conditioning pulses when PP=1. This parameter is ignored when PP=0.	Prevacuum Gravity
Con Ramp Down Ej	The rate of depressurization during the negative pulse subphase.	Prevacuum Gravity
Negative Pulse 1	The maximum vacuum of the first negative conditioning pulse. When this set point is reached, pressurization (positive pulse) begins.	Prevacuum
Negative Pulse 2	The maximum vacuum of subsequent negative conditioning pulse. When this set point is reached, pressurization (positive pulse) begins.	Prevacuum
Vac Dry Setpoint	The chamber pressure during the drying phase. This parameter is required only if the vacuum drying method is selected (gravity cycles) or the cycle is a prevacuum cycle.	Prevacuum Gravity
Exp Overdrive	The set point at which the heatup phase is complete.	Liquids

TABLE 3–8. ADJUSTABLE PARAMETERS (633LS)

Parameter	Description	Cycles
Liquid Dwell Time	The length of time the sterilizer is in the liquid dwell phase. During this time. the load heats up until it is close to the chamber temperature. When the dwell timer expires, exposure begins. If the controls detect that the liquid RTD (load probe) is inserted, the dwell phase is skipped.	Liquids
Fo Val Reached	The F_0 value at which the liquid exposure phase is complete.	Liquids

EXTENDED PARAMETERS

The cycle parameters that can be adjusted by a user with a Configuration (G) password access are listed in Table 3–6. See *“Editing the Extended Parameters” on page 5–43* for the procedure.

TABLE 3–9. EXTENDED PARAMETERS (633LS)

Parameter	Description	Cycles
Gasket Heat Time	If the jacket temperature falls below 100°C (212°F), the door gasket headring will be flushed for a specified time at the start of the next cycle. Steam flowing through the headring purges the air and flashes off any condensate that resulted when the jacket cooled.	All Cycles
Start Drain Cool	To comply with plumbing codes, the discharge from the sterilizer to the facility drain must not exceed 60°C (140°F). Start Drain Cool is the setpoint at which cooling water is added to the discharge from the sterilizer.	All Cycles
Drain Cool Diff	The deadband of the drain cooling temperature control routine. For example, if the Start Drain Cool temperature is 55°C (131°F) and the Drain Cool Diff is 5°C (9°F), the cooling water will be turned off when the drain temperature falls below 50°C (122°F).	All Cycles

FUNCTIONAL DESCRIPTION

NOTE
Refer to Figure 6–5, Sheet 1 on page 6–14 and Figure 6–10 on page 6–24 for detailed information about the control system.

CONTROL SYSTEM

Refer to *Figure 3–19 on page 3–49*. The sterilizer requires 115 Vac primary power which is connected at Power Box 1A. Power Box 1A provides 24 Vac to Control Box 2A and 115 Vac for the door motors.

NOTE
If the mains voltage is 230 Vac, optional Integral Transformer 9A (mounted on the unit at the factory) steps down the voltage to 115 Vac.

If the mains voltage is higher than 360 Vac, optional Universal Transformer 8A (installed in field at a location provided by the customer) steps down the voltage to 115 Vac.

Control Box 2A contains three printed circuit boards: CPU Board 1U, CM10 Board 2U, and I/O I/F Board 3U. The CPU Board includes the microprocessor and EPROMs on which the software program is stored, and communicates with the CE Display Panel 3A, Printer 13A, and RE Display Panel 5A (on double door units).

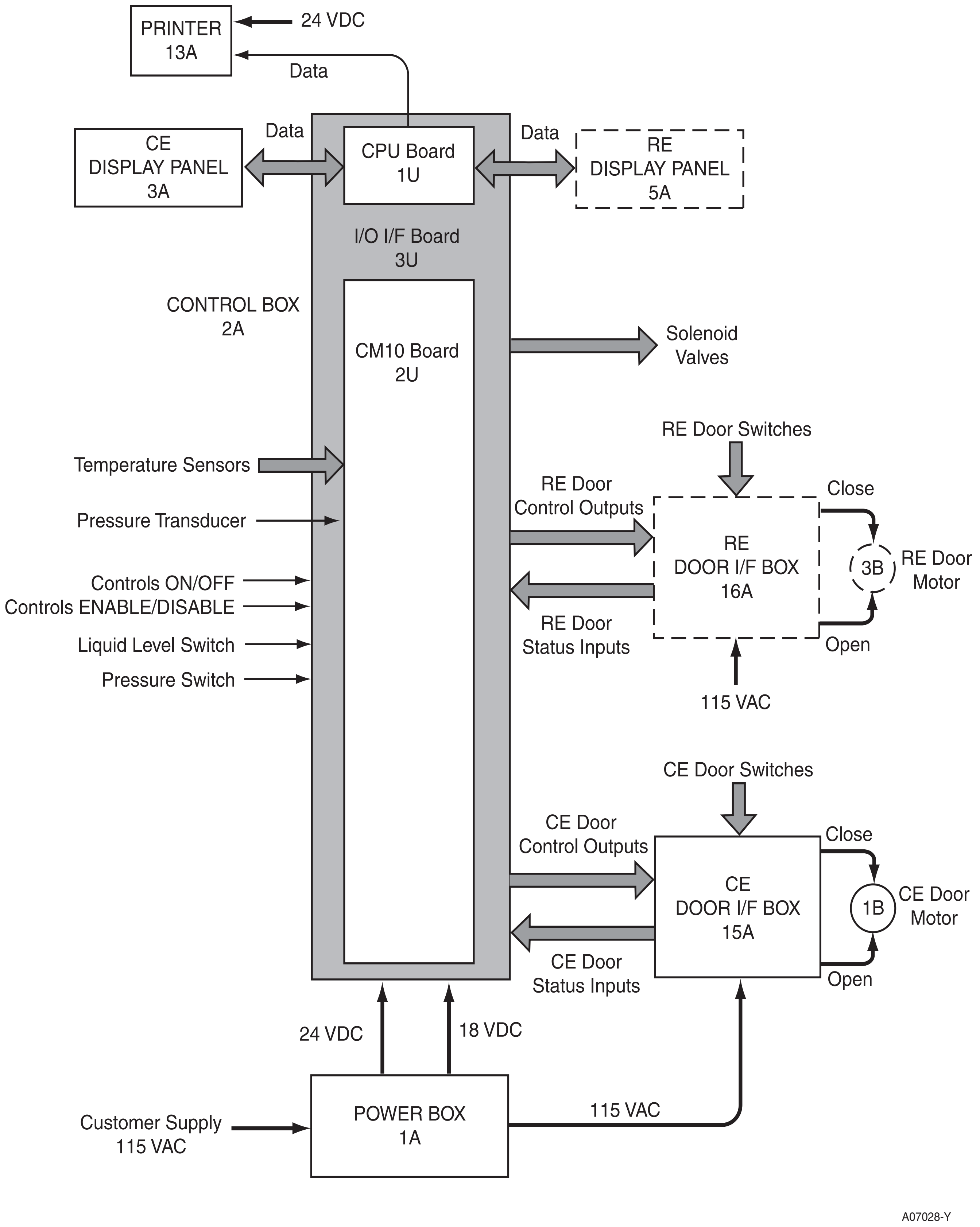
The CM10 Board includes the digital input and digital output relays and connectors for the analog inputs. It also has LED indicators that indicate when a digital input or output is activated.

The I/O I/F Board is the backplane for the CPU and CM10 Boards and includes the power supply filter and alarm buzzer circuits.

Five analog inputs are connected to the Control Box:

- Chamber Temperature sensor 1RT.
- Jacket Temperature sensor 2RT.
- Load Temperature sensor 3RT (633LS only)
- Drain Temperature sensor 5RT.
- Chamber Pressure transducer 1PT.

FIGURE 3–19. 600 SERIES CONTROL SYSTEM BLOCK DIAGRAM


PRINTER
13A
24 VDC
Data
CE
DISPLAY PANEL
3A
Data
CPU Board
1U
Data
RE
DISPLAY PANEL
5A
I/O I/F Board
3U
CONTROL BOX
2A
CM10 Board
2U
Solenoid
Valves
RE Door Switches
Temperature Sensors
RE Door
Control Outputs
Close
Pressure Transducer
RE
DOOR I/F BOX
16A
3B
RE Door
Motor
Controls ON/OFF
Controls ENABLE/DISABLE
Liquid Level Switch
RE Door
Status Inputs
Open
Pressure Switch
115 VAC
CE Door Switches
CE Door
Control Outputs
Close
CE
DOOR I/F BOX
15A
1B
CE Door
Motor
CE Door
Status Inputs
Open
24 VDC
18 VDC
Customer Supply
115 VAC
POWER BOX
1A
115 VAC
A07028-Y

Three switch inputs are connected directly to the Control Box:

- Controls ON/OFF
- Door(s) Sealed pressure switch 4S.

NOTE

If a 633LS sterilizer is configured for door seal interlock or unidirectional doors, Door(s) Sealed pressure switch 4S is replaced by CE Door Sealed pressure switch 4S and RE Door Sealed pressure switch 8S.

- Liquid Level sensor 5S

The CE Door Closed switch 3S, CE Door Open switch 22S, and photo eye switch 1LE/1LR switches are connected to CE Door I/F Box 15A. On double door units, RE Door Closed switch 7S, RE Door Open switch 22S, and photo eye switch 2LE/2LR switches are connected to RE Door I/F Box 16A. Door I/F Box(es) 15A (and 16A) send the following digital inputs to the Control Box:

- CE Door Closed
- CE Door Open
- CE Not Obstructed
- RE Door Closed
- RE Door Open
- RE Not Obstructed

When the operator presses the CLOSE DOOR or OPEN DOOR switch on the control panel, the Control Box sends a 24 Vac digital output to the associated Door I/F Box. The motor controller and relays in the Door I/F Box operate the door motor in the correct direction. The motor stops when the Door Open or Door Closed switch is actuated or if an obstruction is detected.

NOTE

If a 633LS sterilizer is configured for door seal interlock or unidirectional doors, Door(s) Seal valve 10SV is replaced by CE Door Seal valve 10SV and RE Door Seal valve 11SV; Door(s) Unseal valve12SV is replaced by CE Door Unseal valve 12SV and RE Door Unseal valve 13SV.

The control software monitors the analog and switch inputs and operates the following solenoid valves:

- Steam to Chamber valve 1SV
- Chamber Drain valve 2SV
- Chamber Air-In valve 3SV
- Water to Ejector valve 6SV

- Steam to Jacket valve 8SV
- Door(s) Seal valve 10SV
- Door(s) Unseal valve 12SV
- Secondary Drain valve 14SV.

PIPING SYSTEM

When the sterilizer is in standby mode, Steam to Jacket valve 8SV supplies steam to the chamber jacket as needed to maintain the jacket temperature. When the door is sealed, Door(s) Seal valve 10SV supplies steam to the gasket headring(s) and pressure switch 4S is actuated. Pressure switch 4S is an electromechanical safety device; when the doors are not sealed (4S is open) steam cannot enter the chamber.

On 633LS units with door seal interlock or unidirectional doors, CE Door Seal valve 10SV (RE Door Seal valve 11SV) supplies steam to the CE (RE) door gasket headring and pressure switch 4S (8S) is actuated.

NOTE

Refer to Figure 6–2 on page 6–4 and Figure 6–3, Sheet 1 on page 6–5 or Figure 6–4, Sheet 1 on page 6–9 for detailed information about the process described below.

During the processing cycle, Steam to Chamber valve 1SV supplies saturated steam as required to pressurize the chamber and maintain the exposure temperature. During the heatup and exposure phases, Secondary Drain valve 14SV allows the steam to slowly bleed from the chamber.

During the cycle phases when the chamber is evacuated, Water to Ejector valve 6SV is turned on and the ejector produces a vacuum. Chamber Drain valve 2SV allows the steam to be rapidly discharged from the chamber. During liquids cycles, Secondary Drain valve 14SV controls the chamber cooldown ramp rate during the exhaust phase. Water to Ejector valve 6SV adds cooling water to the discharge from the sterilizer to prevent the drain temperature from exceeding 140°F (60°C).

At the end of the cycle, Air-In valve 3SV opens to allow the chamber pressure to return to atmospheric pressure. When the door is unsealed, Door(s) Unseal valve 12SV allows the gasket headring to be evacuated by the ejector.

On 633LS units with door seal interlock or unidirectional doors, CE Door Unseal valve 12SV (RE Door Unseal valve 13SV) allows the CE (RE) door gasket headring to be evacuated by the ejector.

LOADING ACCESSORIES

The chamber length determines which loading accessories can be used with the sterilizer:

- 26” length units are equipped with a rack and extendable shelves.
- 39” length units may be equipped with a track for a loading car and transfer carriage or a rack and extendable shelves.
- 51” length units are equipped with a track for a loading car and transfer carriage.

CAUTION

Do not place items on the floor of the chamber; this can block the drain and result in non-sterile or damaged loads. Always use the loading car or shelf.

NOTE

Units equipped for rack and shelves will not accept a loading car and transfer carriage.

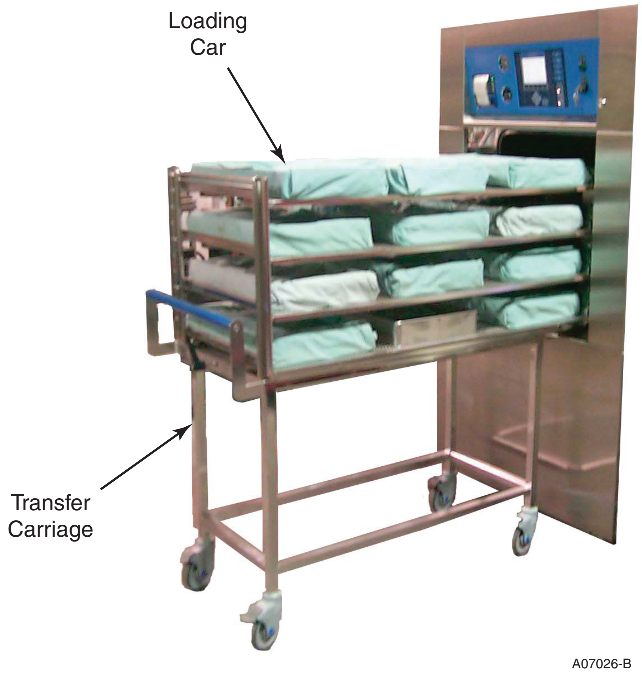
LOADING CAR AND TRANSFER CARRIAGE

WARNING

AVOID INJURY: The loading car can hold a total maximum load of 440 lbs. The shelves on the car are able to hold a maximum of 275 lbs. evenly distributed on each shelf, but the total weight of 440 lbs. on the car must not be exceeded. Do not exceed these weight limits.

Loading car and transfer carriage operation is described in the 633HC or 633LS User Manual.

FIGURE 3–20. LOADING CAR AND TRANSFER CARRIAGE



RACK AND EXTENDABLE SHELVES

WARNING

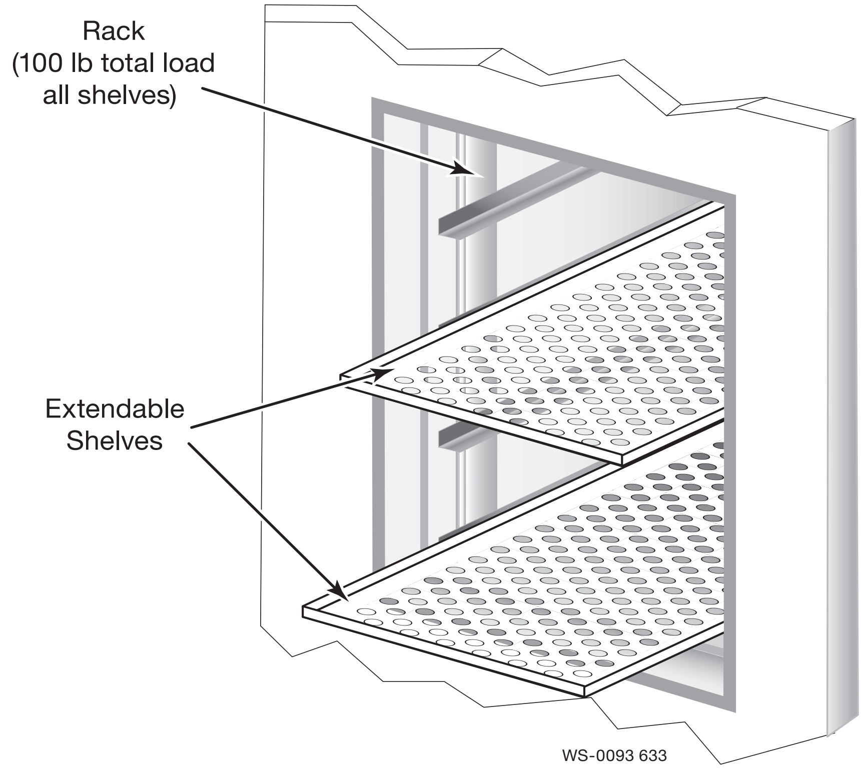
AVOID INJURY: The rack can support a maximum load of 100 lbs. An individual shelf can hold up to 50 lbs. evenly distributed. Up to four shelves can be placed on the rack as long as the total maximum weight of 100 lbs. is not exceeded.

AVOID INJURY: Do not place more than 20 lbs. on the end of an extended shelf.

AVOID INJURY: Do not extend a shelf with liquid loads (hot or cold) on it. Liquid loads should never be placed on an extended shelf.

The rack and shelves are constructed of 300 series stainless steel and are removable for cleaning. The rack can hold up to four shelves. Two shelves are supplied; additional shelves may be purchased as an option.

FIGURE 3–21. RACK AND SHELVES



OPTIONAL EQUIPMENT

STEAM BOILER

GENERAL DESCRIPTION

WARNING
FIRE HAZARD: Loose electrical connections may result in an electrical fire. When performing periodic maintenance, check that the heating elements, element flange bolts, contactors, and three-phase supply terminal block are torqued to the values specified in Figure 4–16, Sheet 1 on page 4–33 or Figure 4–16, Sheet 2 on page 4–34.

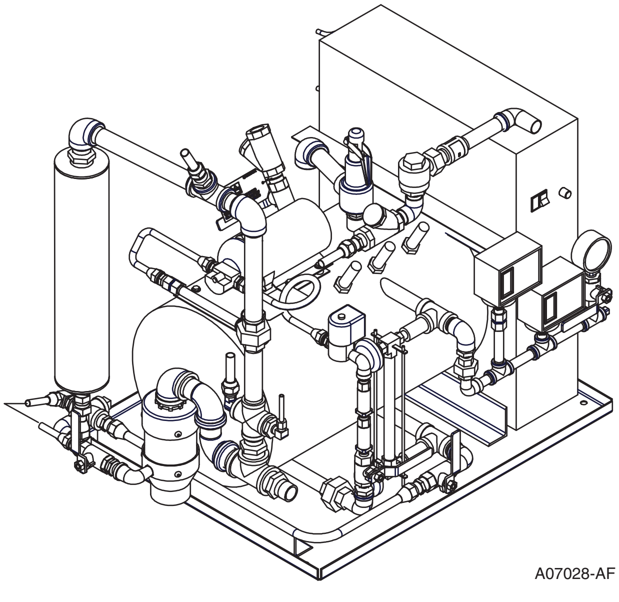
CAUTION
Be sure all electrical connections around the heating element (contactor, buss bars, wires, etc.) are tightened to the specified torque; otherwise overheating and burning of components may result.

NOTE
The boiler power ON/OFF switch is set in the ON position after sterilizer installation. It should be left in the ON position through the course of normal day-to-day operation.

The boiler should be at operating pressure before starting a cycle. If the boiler does not generate steam, make sure that the electrical supply circuit to the boiler is turned on, the shutoff valve in the water supply line is open, and the drain valve is closed.

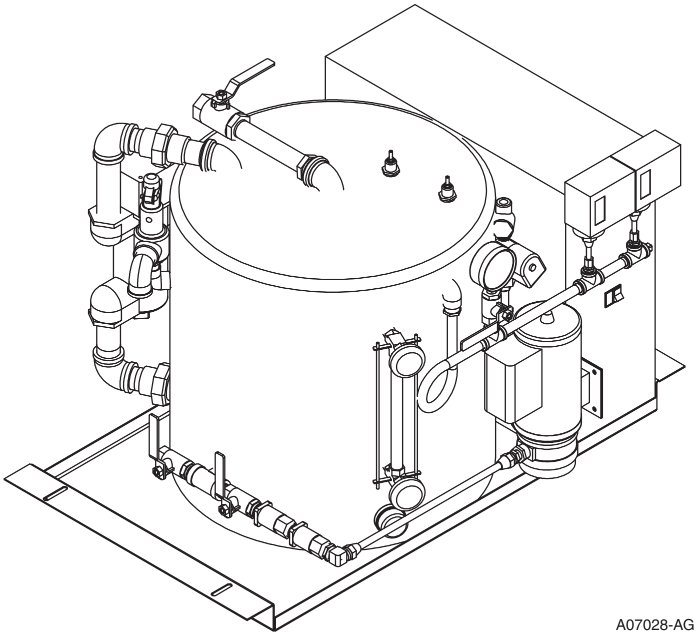
The GTS-30A is a 30 KW boiler that provides a steam supply for units with a 26 in. chamber length. Refer to *Figure 6–14, Sheet 1 on page 6–30* for the wiring diagram.

FIGURE 3–22. GTS-30A STEAM BOILER



The CAS-45A is a 45 KW boiler that provides a steam supply for units with a 39 in. or 51 in. chamber length. Refer to *Figure 6–15, Sheet 1 on page 6–32* for the wiring diagram.

FIGURE 3–23. CAS-45A STEAM BOILER



CAUTION
The CAS-45A must be connected to an external blowdown tank/separator. The blowdown tank/separator cools down the steam discharge from the boiler drain to conform with plumbing codes.

Both boiler models are self-contained, electrically-heated units with a solid-state, floatless water-level control. The control is dependent on sensing the electrical resistivity of the water. A de-ionized (demineralized) or distilled water supply can be used provided the electrical resistivity of the water does not exceed 50K ohm-cm. Typically the water from a two-bed demineralizer should be suitable for this purpose.

PRESSURE CONTROLS

Two pressure controls on the front of the boiler control steam pressure. The one on the right controls the OPERATING PRESSURE. The one on the left is a HI-LIMIT pressure control that de-energizes the heating element assembly should the steam pressure in the boiler rise to a predetermined level above the operating pressure. A scale on the front of each pressure control indicates its setting.

1. During normal operation: The OPERATING PRESSURE control maintains a selected level of pressure in the boiler by energizing and de-energizing the heating element contactor (enabling power to the heating elements).
2. During a malfunction: The HI-LIMIT pressure control monitors a selected high level of pressure in the boiler. If the boiler pressure exceeds this value, the HI-LIMIT pressure control disables power to the heating element contactor. The HI-LIMIT pressure control requires a manual reset after the malfunction is corrected.

The pressure controls are factory-adjusted and seldom require adjustment.

WATER QUALITY INFORMATION

If neglected, water quality can affect efficiency or result in improper operation of the boiler. Boiler feedwater contains impurities in solution and suspension. These impurities concentrate in the boiler since the steam generated is essentially pure. The concentration of these impurities increases as more feedwater is introduced into the boiler and steam is produced. If the suspended solids are allowed to concentrate beyond certain limits, a deposit or “scale” will form on the boiler internal surfaces. This deposit can interfere with proper boiler operation and cause boiler failure.

NOTE

An analysis of the on-site boiler feedwater should be made by a recognized and reliable water treatment company to ascertain the existing condition and treatment required.

For optimum results, the feedwater supply should be tested every three months. See *“Checking the Boiler Water Quality” on page 4–31*. Feedwater must meet the requirements listed on the roughing-in drawing.

WATER TREATMENT SYSTEM

At some installations, feedwater is supplied to the boiler by an reverse osmosis (RO) water treatment system. To ensure the conductivity level for boiler operation, the post-treatment section of the RO water system includes a calcite feeder.

BOILER BLOWDOWN

The concentration of these feedwater impurities is generally controlled by blowdown and by the feedwater quality. Blow-down refers to removing a portion of the boiler water having a high concentration of solids and replacing it with water having a low concentration. Blow down the boiler daily to lower the concentration of impurities and maintain the proper pH level.

TABLE 3–10. BOILER BLOW-DOWN (BY CUSTOMER)

Water Conditions	Blow-Down Frequency	Drain Valve Open Time
Hard water	Daily	10 seconds
Soft water	Weekly	10 seconds
RO water treatment system	Monthly	10 seconds

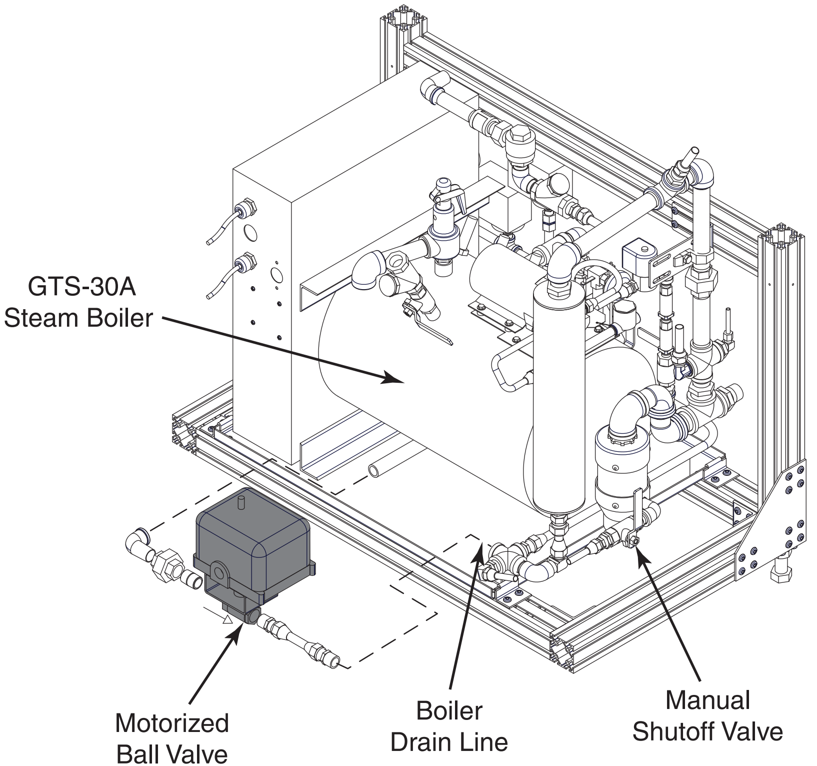
☞ ***NOTE***

The customer may need to adjust the time based on the results of cleaning the heating elements during maintenance.

AUTOMATIC BOILER BLOW-DOWN

The Auto Blow-Down package includes a motorized valve that blows down the boiler at a specified time each day. The motorized valve is activated by the DO15 output from the Control Box.

FIGURE 3–24. AUTO BLOW-DOWN VALVE



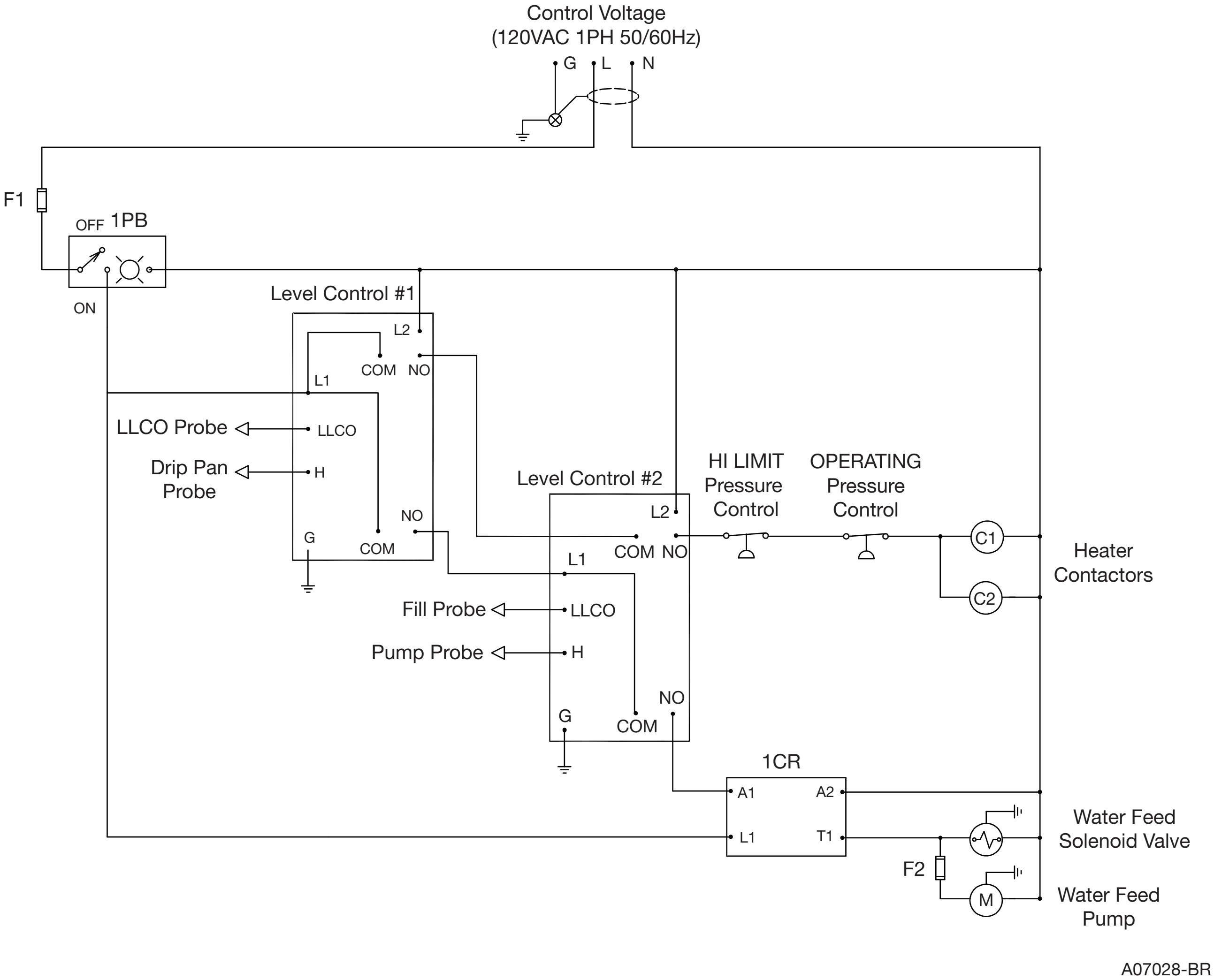
THEORY OF OPERATION—GTS-30A

Refer to Figure 3–25. Each boiler requires both a low-voltage power feed for control operation (typically 120 Vac) and a high-voltage power feed for heater operation (various voltages). The sterilizer controls provide the 120 Vac supply; the three-phase voltage for the heaters is supplied by the customer.

On 208 and 240 Vac boilers, the heater elements are wired as two delta-connected circuits. The elements are the same voltage as the three-phase supply.

On 480 Vac and 600 Vac boilers, the 240 V heater elements are connected as a single delta-connected circuit.

FIGURE 3–25. GTS-30A CONTROL CIRCUIT


Control Voltage
(120VAC 1PH 50/60Hz)
G
L
N
F1
OFF
1PB
ON
Level Control #1
L2
COM
NO
L1
LLCO Probe
LLCO
Drip Pan Probe
H
NO
G
COM
Level Control #2
L2
L1
COM
NO
HI LIMIT Pressure Control
OPERATING Pressure Control
C1
C2
Heater Contactors
Fill Probe
LLCO
Pump Probe
H
G
COM
NO
1CR
A1
A2
L1
T1
Water Feed Solenoid Valve
F2
M
Water Feed Pump
A07028-BR

Refer to Figure 3–25. The boiler has a solid-state water level control (LC2) with a FILL probe, and a PUMP probe. The boiler also has an auxiliary low-water cut out control (LC1) with a low-level cut out probe (LLCO), and a safety flood-water cut out probe (DRIP PAN).

The probes sense the water level by measuring a small current flowing through the water between the probe and the boiler chamber. The water must have a resistivity of no more than 4700 ohms for the LLCO probe to function properly. A small voltage is applied across the shell of the boiler and the probes. When there is water between the probe and the shell, the controls interpret the current between the probe and the shell as water being present. If there is no water between the probe and the shell, no current will be sensed.

Starting with an empty boiler with the power switch ON, power is supplied to the auxiliary control (LC1) and water level control (LC2), provided that the DRIP PAN probe input is high (LC1-H circuit is energized). The PUMP probe input is also high (LC2-H circuit is energized) and its associated LED is lit. The FILL probe senses no water and the LC2-LLCO contacts close, energizing relay 1CR which turns ON the water feed solenoid valve and pump. The fill LED on the control board lights.

As water fills the boiler, the LLCO probe senses the water and the LC1-LLCO contacts close. The heater contactors are energized through the HI LIMIT and OPERATING pressure switches. The boiler starts to heat up and the water level continues to rise until the FILL probe senses the water. The control keeps the fill circuit energized for an additional five (5) seconds after which 1CR is de-energized, turning off the solenoid valve and pump.

As steam is produced and used, the water level in the boiler drops. When the water drops below the FILL probe, 1CR is energized and the boiler refills with water. Again the fill continues for five (5) seconds after the FILL probe senses water.

The boiler continues heating until the OPERATING pressure switch reaches its set point, at which the contactors de-energize. When the pressure in the boiler drops to the differential setting on the pressure switch, the switch will reactivate the contactors. If the OPERATING control should fail and the pressure exceeds the setting on the HI LIMIT pressure switch, the HI LIMIT switch opens and de-energizes the contactors. Since the HI LIMIT switch has a manual reset control, the contactors will not be energized until the pressure is reduced and the manual reset lever is pressed.

If the water level rises to the PUMP probe and remains there for at least 3 seconds, the LC2-H circuit will be de-energized, removing power from both the water feed pump and the heater contactors.

If the water level drops below the LLCO probe for at least 3 seconds, the auxiliary LWCO control (LC1) removes the control voltage from the water level control (LC2), which de-energizes the heater contactors.

Standard units automatically reset when the water level rises above the LLCO probe. However, some units have a manual reset for the auxiliary cut out control as required by some local codes.

The controls will respond to fault conditions as follows:

- Power Interruption. Both the water level control and the auxiliary cut out control will return to normal operation when power is restored.
- PUMP Probe Open. If either wire to the PUMP probe becomes disconnected for at least 2 seconds, the PUMP circuit de-energizes, removing power from the pressure controls and heater contactors.
- FILL Probe Open. The boiler will continue to fill until the PUMP probe senses an overfill condition.
- LLCO Probe Open. The water level control de-energizes the heater contactors.

THEORY OF OPERATION—CAS-45A

Refer to Figure 3–26. When the sterilizer controls are activated and the boiler ON/OFF switch (1S) is turned ON, power is applied to the liquid level control board. The liquid level control board monitors and controls water levels in the boiler and enables power to the heating elements contactor via the pressure switches. The pressure switches monitor and control the pressure in the boiler.

FIGURE 3–26. CAS-45A CONTROL CIRCUIT (WITH LWCO)

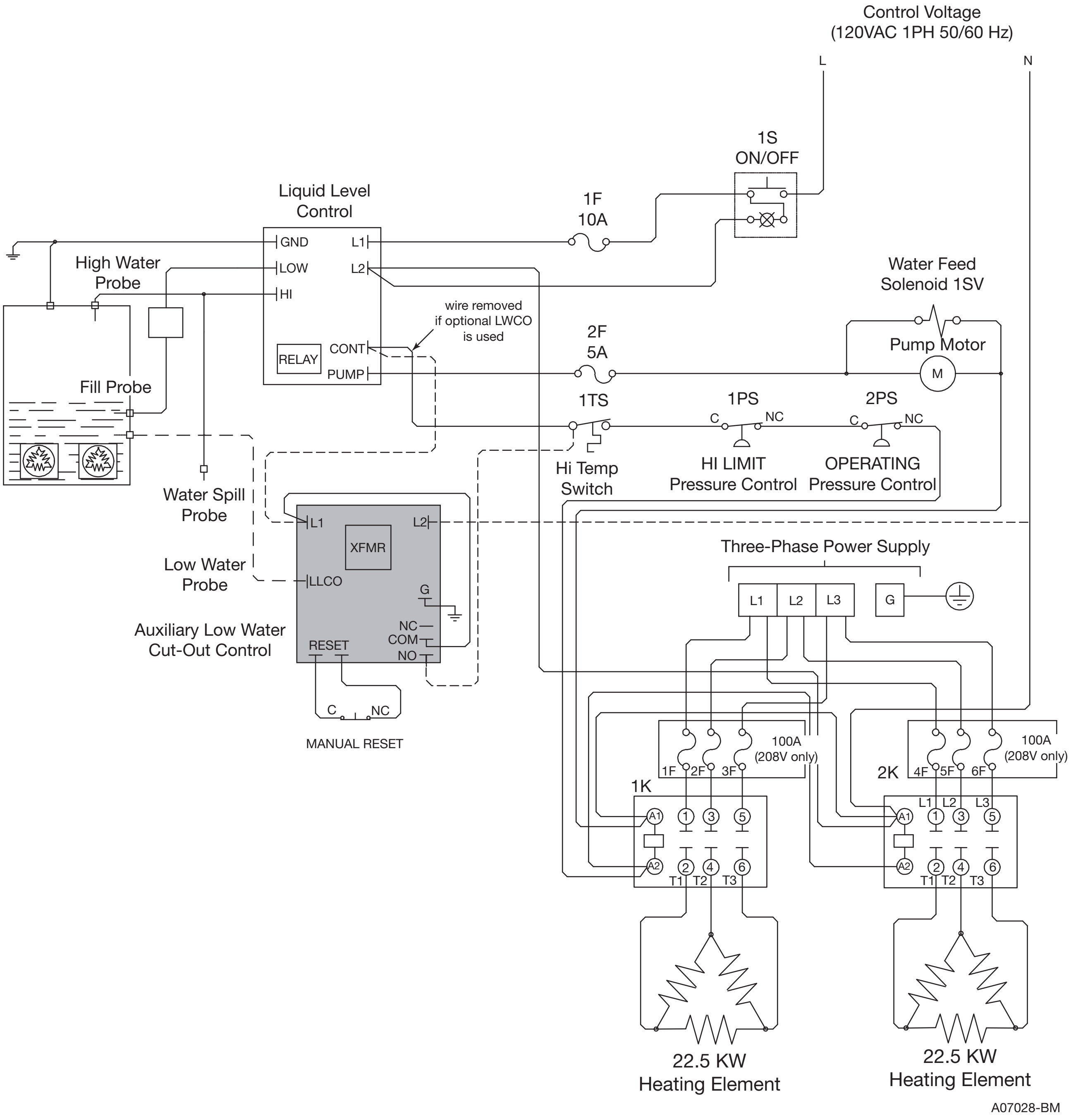
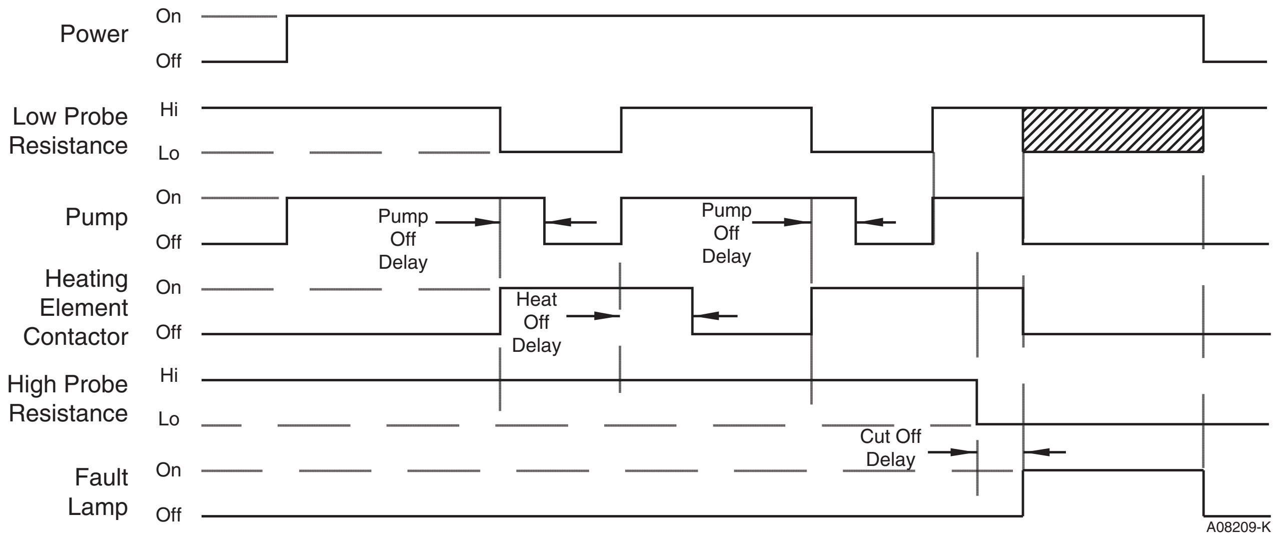

Control Voltage
(120VAC 1PH 50/60 Hz)
L
N
1S
ON/OFF
Liquid Level
Control
1F
10A
GND
L1
LOW
L2
HI
High Water
Probe
Water Feed
Solenoid 1SV
wire removed
if optional LWCO
is used
2F
5A
Pump Motor
M
CONT
RELAY
PUMP
Fill Probe
1TS
1PS
2PS
C
NC
C
NC
Hi Temp
Switch
HI LIMIT
Pressure Control
OPERATING
Pressure Control
Water Spill
Probe
L1
L2
XFMR
Three-Phase Power Supply
Low Water
Probe
LLCO
L1
L2
L3
G
G
Auxiliary Low Water
Cut-Out Control
NC
COM
NO
RESET
C
NC
MANUAL RESET
100A
(208V only)
1F
2F
3F
1K
100A
(208V only)
2K
4F
5F
6F
L1
L2
L3
A1
1
3
5
A2
2
4
6
T1
T2
T3
A1
1
3
5
A2
2
4
6
T1
T2
T3
22.5 KW
Heating Element
22.5 KW
Heating Element
A07028-BM

FIGURE 3–27. CAS-45A LIQUID LEVEL CONTROL TIMING DIAGRAM


Power
On
Off
Low Probe Resistance
Hi
Lo
Pump
On
Off
Pump Off Delay
Pump Off Delay
Heating Element Contactor
On
Off
Heat Off Delay
High Probe Resistance
Hi
Lo
Cut Off Delay
Fault Lamp
On
Off
A08209-K

Refer to Figure 3–27. The liquid level control operates as follows:

1. During initial power-up of the boiler: If the water level is below the feed water probe (LO input is at a high state), the PUMP output is activated. The CONT output remains disabled until the water feed probe senses water.
2. During normal operation: The liquid level control board maintains the water level in the boiler.
   a. If the water level is below the water feed probe (LO input is at a high state), the PUMP output is activated (120 Vac) and turns ON the water solenoid/pump allowing water to enter the boiler.
   b. When the water feed probe senses water (LO input is at a low state), the CONT output is enabled for providing power (120 Vac) to the heating element contactors. After a 9-second delay, the PUMP output turns OFF.
3. During a malfunction: The liquid level control board also disables power to the heating element contactor (CONT output) and/or water solenoid/pump (PUMP output).
4. If during step 2a above, the water feed probe (LO input) has not sensed water within 16 seconds, the CONT output is disabled.
5. If the high water probe or water spill probe (HI input) has sensed water, the CONT and PUMP outputs are disabled after a 3 second delay.

Some installations may require an auxiliary low water cutoff circuit to address CSD-1 ASME requirements. The circuit consists of a low water cutoff board and a low water probe that interfaces with the existing steam boiler controls. The low water cutoff control operates as follows:

1. Refer to *Figure 3–26 on page 3–61*. When the water level is below the low water probe, the path between COM and NO on the low water cutoff board remains open and therefore disables power (120 Vac) to the heating element contactor.
2. Once the water level reaches the low water probe and the manual reset switch is pressed, the path between COM and NO closes, thus enabling power to the heating element contactor.

NOTE

The manual reset switch must be pressed every time power is applied to the steam boiler even if the low water probe senses water.

Depending on the installation requirements, the low water cutoff can be configured to automatically reset. This would allow the steam boiler to be turned ON/OFF remotely by the sterilizer controls. To configure the low water cutoff for auto reset, swap the signal lines at the HI and LO on the low water cutoff board.

LOAD PROBE (633LS ONLY)

DESCRIPTION

The optional load probe (liquid RTD) is a 150 mm (5.94 in.) long temperature sensor that is inserted in a liquid load to monitor the load. The load probe cable from the fitting to the probe is1675 mm (66 in.) long.

When the load probe is used, the exposure phase timing starts when both the load and chamber RTDs are above the exposure temperature set point. If an F_0 greater than 0.0 is selected, the exposure phase will end when either the F_0 value is reached or the exposure time is exceeded.

The F_0 value is selectable from 0.0 to 100.0 in 0.1 increments. To base exposure timing on chamber temperature, select an F_0 value of 0.0 (F_0 disabled).

WARNING

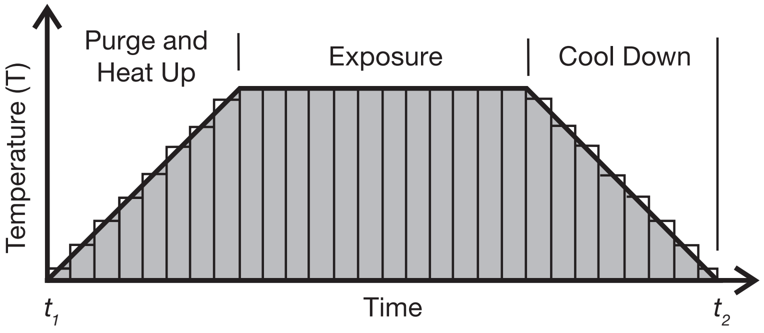
FAILURE TO ACHIEVE DESIRED STERILITY ASSURANCE LEVEL (SAL): The sterilizer is shipped with the F_0 value set to 0.0 (F_0 disabled). Before using the load probe, the user must determine an appropriate F_0 value for the load being processed based on the product (e.g., media) manufacturer's recommendation and process validation results.

DEFINITION OF F0 VALUE

The F_0 value is a measure of the microbiological inactivation capacity of a heat sterilization process. The F_0 value is defined as the equivalent in minutes at 121.1°C (250.0°F) of all the lethal heat in a process to destroy viable microorganisms or spores when the z-value is 10°C.

FIGURE 3–28. DEFINITION OF F0 VALUE

$$F_0 = \int_{t_1}^{t_2} 10^{(T - T_b)/z} \, dt$$



A01844-D

During the cycle, the sterilization controls calculate the F_0 value (the area under the curve in Figure 3–28) using the temperature input from the load probe. The F_0 calculation takes into account the contributions to lethality by the heat-up time and allows an estimate of the sterilization effectiveness of a given set of conditions. In other words, the F_0 calculation allows one to estimate the equivalent exposure time of exposure at a different temperature (higher or lower) such that lethality of the selected conditions is equivalent to that of a timed exposure at 250.0°F (121.1°C).

THEORY OF OPERATION

WARNING
POSSIBILITY OF INJURY: Always keep the load probe in the storage holster when not in use. If the probe is stored improperly, the controls may determine prematurely that the cycle is complete. If the flasks are removed before the cycle is complete, they may burst or crack.

During the liquids cycle, the load probe is enabled or disabled based on the load temperature at the start of the heatup phase. Anytime the load probe is connected to the sterilizer controls, whether it is placed in the load or not, the load temperature can be displayed. The load temperature will be printed whenever the load probe is in use.

At the start of the heatup phase, the controls compare the load temperature and the chamber temperature:

- If the load temperature and chamber temperature are within 18°C (10°F), the exposure timing will be controlled only by the chamber temperature, even if an F_0 greater than 0.0 is selected.
- If the chamber temperature exceeds the load temperature by more than 18°C (10°F), the controls will determine that the load probe is being used and the load temperature will be used to control when exposure is started.

The load probe can be used to control the exposure timing in one or two ways: chamber temperature or F_0 value. Refer to the paragraphs below for a description of each method.

Exposure Timing Based on the Chamber Temperature
(F_0 Disabled, Set to Zero)

If the cycle is based on chamber temperature, the exposure timing begins when both the load and chamber temperatures reach the exposure set point temperature.

During the exposure phase, if either the load or chamber temperature drops below the set point temperature by more than 1°C (1.8°F), the controls will hold the exposure timer until the temperatures are greater than the set point minus 1°C (1.8°F).

NOTE
The load temperature must be below 95°C (203°F) before the door can be opened at the end of the cycle.

At the end of the cycle, the controls do not advance to the Cycle Complete phase and allow the door(s) to be unsealed until the load temperature is at 95°C (203°F) or below.

Exposure Timing Based on the F_0 Value

To select exposure timing based on the F_0 value, the user must select an F^0 value greater than 0.0. The F_0 feature is selected on a per cycle basis; for example, if a sterilizer has two liquids cycles, the exposure temperature for one may be based on F_0 and the other based on chamber temperature. Once an F_0 value is selected, it will remain associated with that cycle until the cycle settings are changed.

WARNING

RISK OF CROSS-CONTAMINATION: When an F_0 greater than 0.0 is selected, be sure the exposure time setting is at least 10% longer than the estimated exposure time of the F_0 function. If the exposure time is too short, the exposure timer expires before the F_0 value is reached and the sterility assurance level (SAL) will not be achieved.

NOTE

The load probe must be used to control a cycle based on F_0.

When F_0 control is selected, the F_0 value is printed at the start of each cycle phase. The F_0 calculation begins in the liquid heatup phase. The exposure phase ends when the F_0 value is reached or the exposure time is exceeded.

If the selected F_0 value is reached before the sterilizer has entered the exposure phase, the controls wait until the exposure phase in entered before entering the liquid exhaust phase. For example, if an F_0 of 1 is selected and achieved during heatup, the cycle advances from liquid heatup to liquid exposure to cooldown when the exposure temperature set point is reached.

NOTE

The load temperature must be below 95°C (203°F) before the door can be opened at the end of the cycle.

At the end of the cycle, the controls do not advance to the Cycle Complete phase and allow the door(s) to be unsealed until the load temperature is at 95°C (203°F) or below.

BOOSTER PUMP

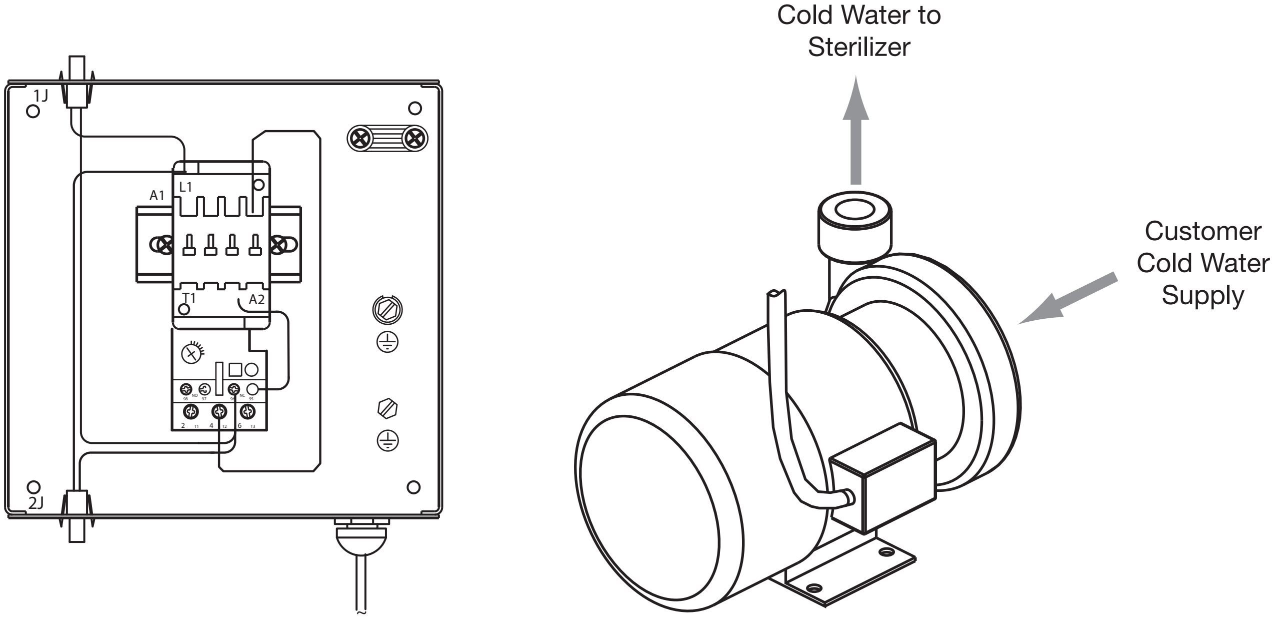
DESCRIPTION

The booster pump is used to increase the water supply pressure so that it meets the minimum cold water pressure specified on the roughing-in drawing.

NOTE

The booster pump wiring is shown on Figure 6–9, Sheet 1 on page 6–22.

FIGURE 3–29. BOOSTER PUMP PACKAGE


Cold Water to Sterilizer
Customer Cold Water Supply
1J
2J
A1
L1
T1
A2

JUNCTION BOX 11A
(shown with cover removed)

BOOSTER PUMP

A07028-AP

THEORY OF OPERATION

The booster pump is activated by the Water to Ejector output (DO 05) from the Control Box. The relay in the junction box energizes the pump and Water to Ejector valve 6SV.

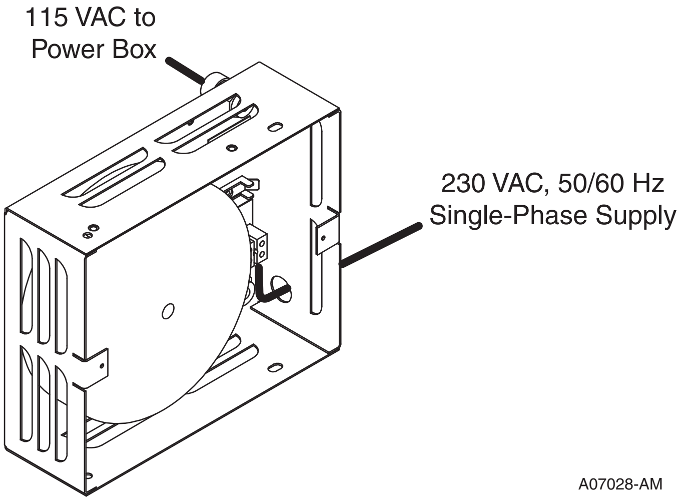
INTEGRAL TRANSFORMER

The integral transformer is required when the customer's electrical supply is 230 Vac. This factory-installed option steps down the mains voltage to the 115 Vac required by the power box.

☞ ***NOTE***

The integral transformer is mounted on the sterilizer frame and is designated as 9A on Figure 6–9, Sheet 1 on page 6–22.

FIGURE 3–30. INTEGRAL TRANSFORMER 9A


115 VAC to
Power Box
230 VAC, 50/60 Hz
Single-Phase Supply
A07028-AM

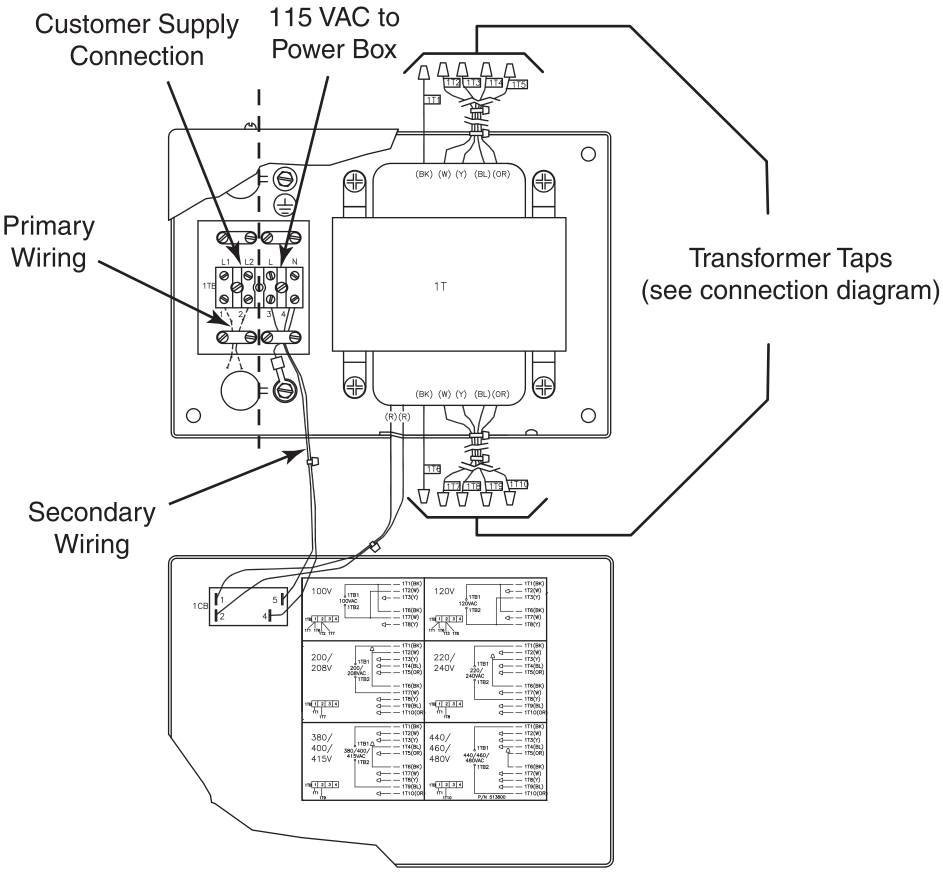
UNIVERSAL TRANSFORMER

The universal transformer is required when the customer's electrical supply is other than 115 Vac or 230 Vac. This option is installed by the customer and the transformer taps must be wired for the correct primary voltage.

☞ ***NOTE***

The universal transformer is mounted at a location provided by the customer and is designated as 8A on Figure 6–9, Sheet 1 on page 6–22.

FIGURE 3–31. UNIVERSAL TRANSFORMER 8A


Customer Supply Connection
115 VAC to Power Box
Primary Wiring
Secondary Wiring
Transformer Taps (see connection diagram)
1T
1TB
L1
L2
L
N
1
2
3
4
(BK) (W) (Y) (BL) (OR)
(R) (R)
1T1
1T2
1T3
1T4
1T5
1T6
1T7
1T8
1T9
1T10
1CB
100V
120V
200/ 208V
220/ 240V
380/ 400/ 415V
440/ 460/ 480V
P/N 513800
A07028-AN

UNINTERRUPTIBLE POWER SUPPLY (UPS)

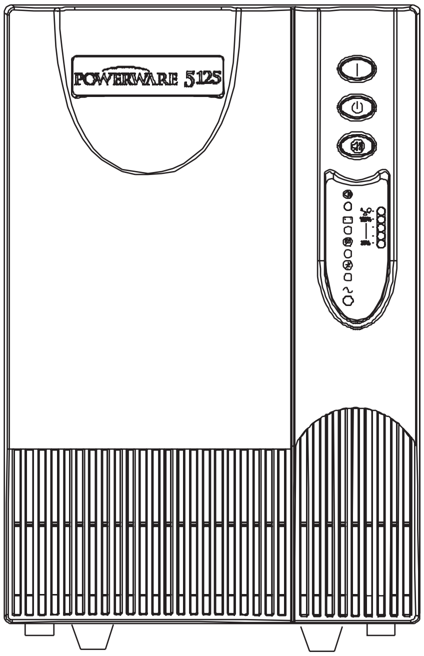
DESCRIPTION

The uninterruptible power supply (UPS) provides 115 Vac power for the sterilizer in the event of a power failure.

NOTE

The connection of the UPS is shown on Figure 6–9, Sheet 1 on page 6–22.

FIGURE 3–32. UNINTERRUPTIBLE POWER SUPPLY (UPS)



A08214-A

The UPS is capable of starting and completing a 30 minute exposure cycle with no dry time, including closing the door at the start of the cycle and opening the door at the end of the cycle. The UPS operates only the controls to complete the cycle that is running at the time of the power failure. No optional equipment (such as the steam boiler and the water saver) operates with the UPS.

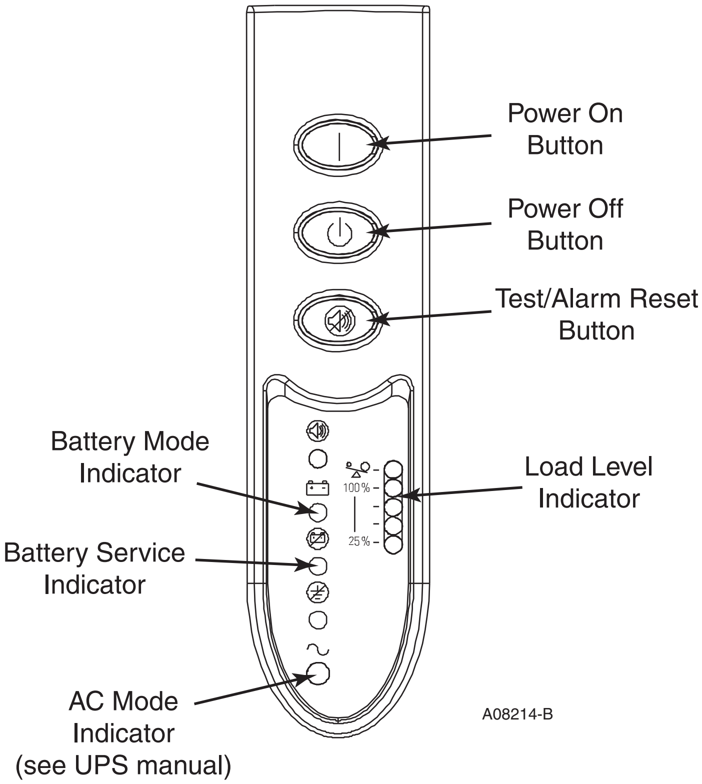
The UPS is capable of starting and completing a 30 minute exposure cycle with no dry time, including closing the door at the start of the cycle and opening the door at the end of the cycle. The UPS operates only the controls to complete the cycle that is running at the time of the power failure. No optional equipment (such as the steam boiler and the water saver) operates with the UPS.

THEORY OF OPERATION

NOTE

Refer to the manufacturer's instruction manual for detailed operating and maintenance information about the UPS.

FIGURE 3–33. UPS CONTROLS AND INDICATORS


Power On Button
Power Off Button
Test/Alarm Reset Button
Battery Mode Indicator
Load Level Indicator
100%
25%
Battery Service Indicator
AC Mode Indicator (see UPS manual)
A08214-B

When power is available but the UPS is turned OFF, the AC Mode indicator flashes to indicate the UPS is in standby mode. When power is available and the UPS is turned ON, the AC Mode indicator glows steadily.

NOTE

If the AC Mode indicator is a combination of red and green (steady or flashing), the UPS is responding to variations in the line voltage. See the manufacturer's manual for further explanation of the AC Mode indicator.

When power is interrupted, the Battery Mode indicator lights and the UPS beeps every few seconds. If the UPS is in battery mode and the battery is running low, the Battery Service indicator lights and the UPS beeps more frequently to alert the operator.

MP-129F WATER-SAVER

GENERAL DESCRIPTION

The MP-129F Water-Saver is an add-on system that incorporates a water ejector with a pump and a water reservoir to recirculate the water that creates the vacuum necessary for part of the sterilization cycle. The water saver can typically save 70% of the total water used during a cycle.

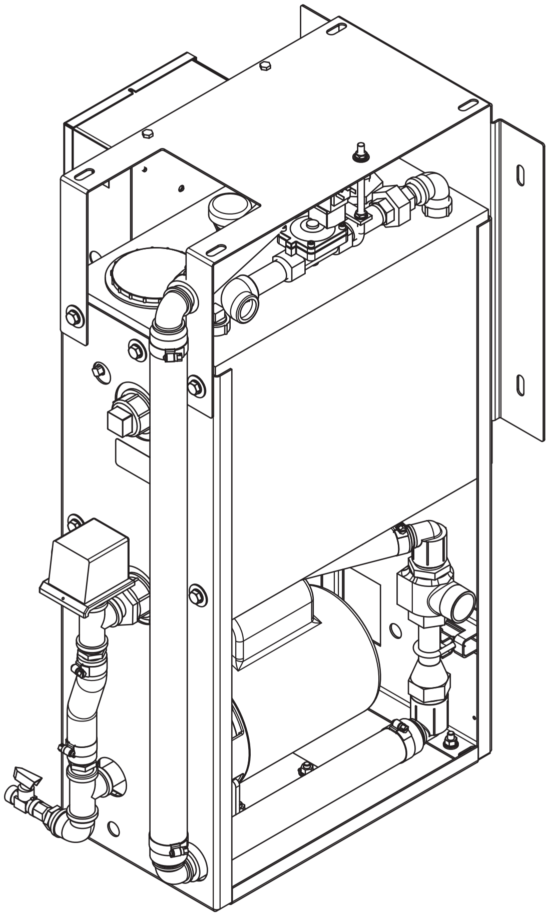
NOTE

DIP Switch DS14 must be set to 1 in order for the water-saver to operate. (see "Enabling the Water-Saver Option" on page 5–54).

The MP-129F Water-Saver does not have a manual bypass switch. To disable the water-saver during service, set DS14 to 0.

Refer to Figure 6–16 on page 6–35 for the water-saver wiring diagram.

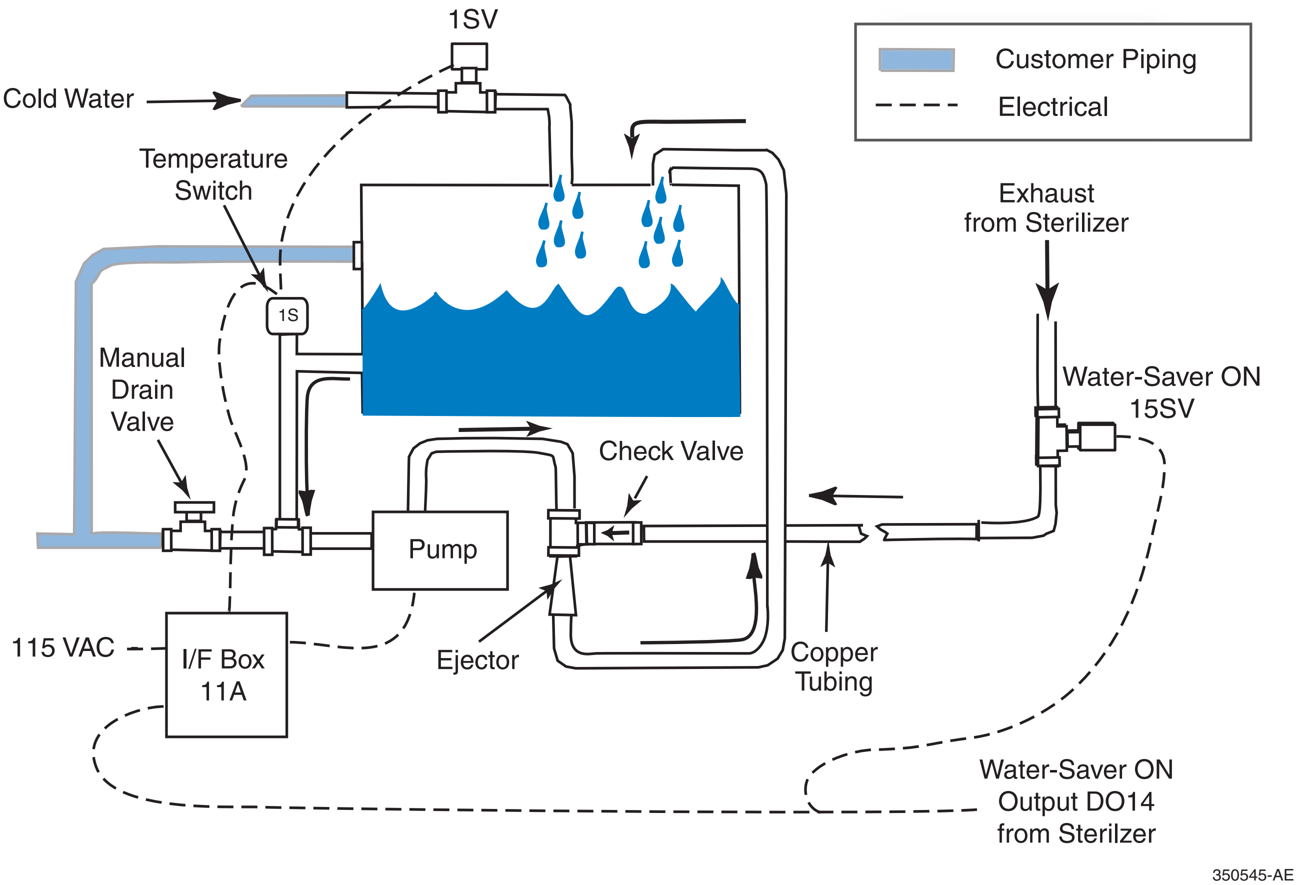
FIGURE 3–34. MP-129F WATER-SAVER



THEORY OF OPERATION

The sterilizer software determines whether the water-saver or the standard ejector in the sterilizer provides the vacuum. While the pressure in the chamber is above -5 psig for vacuum cycles, or above atmospheric pressure for gravity cycles, the sterilizer software selects the standard ejector. When below these values, the software turns on the water saver.

FIGURE 3–35. WATER-SAVER OPERATION


1SV
Customer Piping
Electrical
Cold Water
Temperature Switch
1S
Exhaust from Sterilizer
Water-Saver ON 15SV
Manual Drain Valve
Check Valve
Pump
115 VAC
I/F Box 11A
Ejector
Copper Tubing
Water-Saver ON Output DO14 from Sterilzer
350545-AE

Solenoid valve 6SV, which supplies water to activate the standard ejector, is still active in the sterilizer piping system. However, 6SV is only energized during negative pulses and during the purge above 1 psig.

The cooler the water used for the ejector, the more efficiently the ejector operates. To keep the water in the reservoir below 120°F (49°C), temperature switch 1S controls the flow of cold water through solenoid valve 1SV.

When the water temperature rises above 120°F (49°C), temperature switch 1S signals solenoid valve 1SV to open, allowing cold water to enter the reservoir and cool the water stored there. Temperature switch 1S continually monitors the water temperature within the reservoir. As the reservoir water cools, temperature switch 1S outputs signals to solenoid valve and the solenoid valve gradually decreases the flow of water to the reservoir until it is closed (temperature is below 120°F [49°C]). This maintains the desired water temperature.

Any excess water, such as when cooling water is added to the reservoir, drains through the overflow drain port.

When the pump motor turns on, it draws water from the bottom of the reservoir into the pump. The pump forces the water through the ejector and then recirculates it to the reservoir. This creates the required vacuum for the sterilizer drain.

The water-saver can be bypassed by setting DIP Switch DS14 (Water-Saver) to 0. This permits hospital maintenance or Getinge USA service personnel to switch off the water-saver as a vacuum source and use the sterilizer’s standard ejector with an external water supply.

Located in the feedwater line to the pump, the manual drain valve permits easy draining of the water saver reservoir when required.

SECTION 4 PREVENTIVE MAINTENANCE

INTRODUCTION

This section is divided into three parts:

- Introduction includes general information such as user-serviceable parts, tools and materials, and panel removal, door cover removal, and manual gasket retract procedures.
- Preventive Maintenance includes an inspection procedure, preventive maintenance schedule, and information on PM packages.
- Maintenance Procedures includes procedures for periodic maintenance of the items listed in the preventive maintenance schedule.

NOTE
Refer to the "Recommended Spare Parts List" on page 7–22 for consumables and parts that may be required for preventive maintenance. Assembly drawings and bills of material are included in the 600 Series Parts Catalog.

USER-SERVICEABLE PARTS

Maintenance and repair of the sterilizer is to be performed by trained maintenance personnel and service technicians. To protect the user from hazardous conditions, there are no user-serviceable parts behind the panels or in the service area.

User-serviceable parts are limited to the Consumable Stock items in Appendix A of the User Manual, the chamber sediment screen and the bleed drain guards.

TOOLS AND MATERIALS

Required tools and materials (except for common hand tools) are listed at the beginning of each procedure. Specifications and Getinge part numbers are listed in Appendix C—Specifications for Tools and Materials.

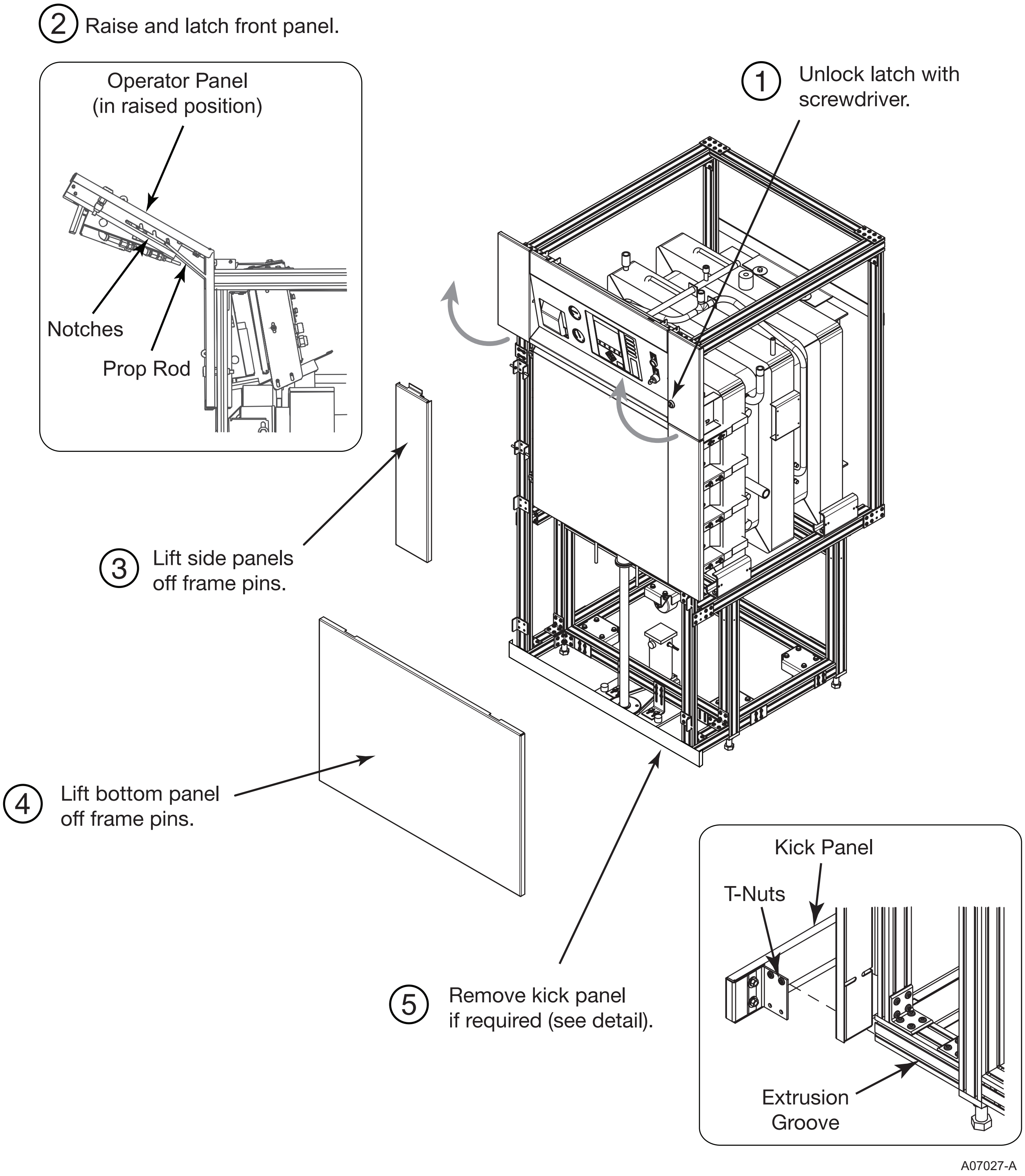
PANEL REMOVAL

REMOVING THE FRONT PANELS

To remove the front panels:

1. Use a screwdriver to turn the keyhole latch and unlock the panels.

FIGURE 4–1. STERILIZER FRONT PANELS


② Raise and latch front panel.
Operator Panel (in raised position)
Notches
Prop Rod
① Unlock latch with screwdriver.
③ Lift side panels off frame pins.
④ Lift bottom panel off frame pins.
⑤ Remove kick panel if required (see detail).
Kick Panel
T-Nuts
Extrusion Groove
A07027-A

2. Unlatch the top panel, swing it open, and prop it up with the props rods found on the left and right sides of the panel.

3. Lift the left and right panels off of the frame pins. The pins slide through the slots on either side of the panels and lift out of the slot in the lower panel.

4. Lift the bottom panel up off of the frame pins.

NOTE

For most maintenance procedures, it is not necessary to remove the kick panel.

---

5. Remove the bottom kick panel by sliding the T-nuts out from the extrusion grooves.

6. Reinstall the panels in reverse order.

REMOVING THE CABINET PANELS

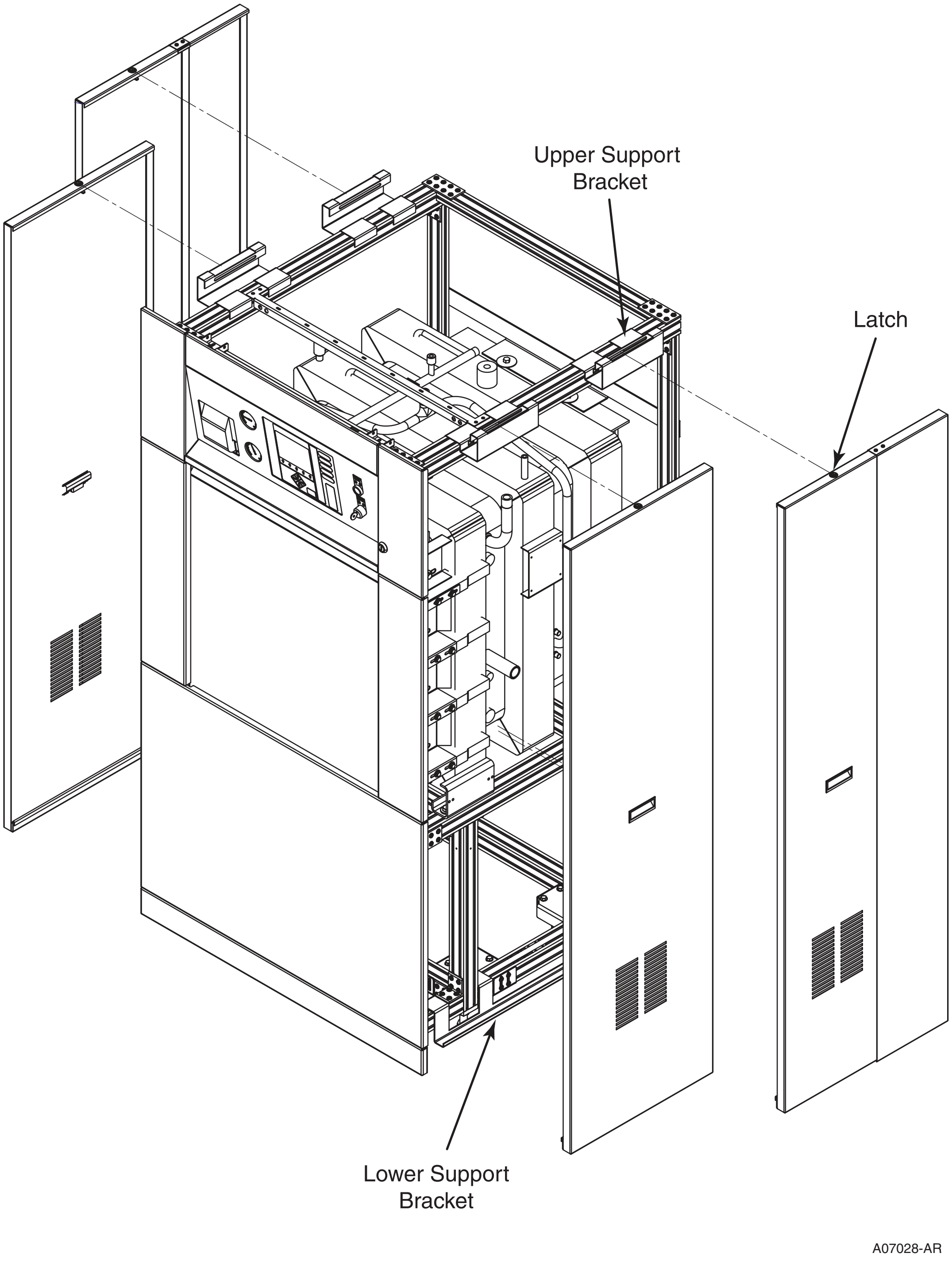
To remove the optional cabinet panels:

1. Using a flat-blade screwdriver, turn the latch one-quarter turn.

2. Lift the panel up and out of the upper and lower support brackets.

3. Reinstall the panels in reverse order.

FIGURE 4–2. CABINET PANELS


Upper Support Bracket
Latch
Lower Support Bracket
A07028-AR

DOOR COVER REMOVAL

In order to allow the door cover to be removed, the door obstruction sensors need to be electrically disconnected from the control system. To do this, the controls are placed in Service Mode (DS20 on the DIPSWITCHES menu) and a jumper is installed inside Door I/F Box 15A (or 16A).

☞ ***NOTE***

Removal of the door cover is usually not required for preventive maintenance. The door cover should only be removed if the door operation check indicates door alignment may be required.

BYPASSING THE DOOR OBSTRUCTION SENSORS (SERVICE MODE)

☞ ***NOTE***

When the controls are in Service Mode, the door(s) can be run up and down but a cycle cannot be started.

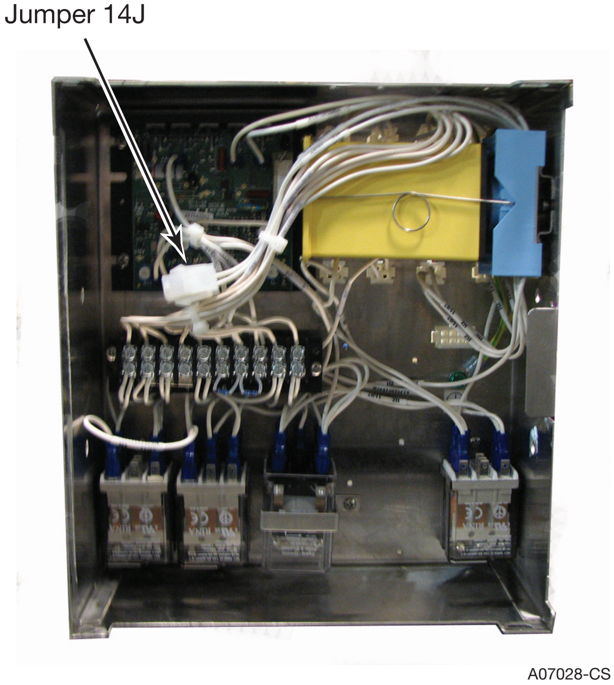
Tools and Materials:

- jumper plug (PN 61301600775)

To bypass the door obstruction sensors:

1. Open the cover of Door I/F Box 15A (CE) or 16A (RE).
2. Locate the 4-pin Molex jack (J14) connected to the obstruction sensor amplifier module (U2).

FIGURE 4–3. LOCATION OF BYPASS JUMPER CONNECTION



3. Plug the jumper into J14.
4. Press [SETUP]

HARDWARE SETUP
ACCESS REQUIRED

5. Select SYSTEM MENU > enter password > DIPSWITCHES.
6. Press ENTER.

   The DIPSWITCHES screen appears.

7. Set DS20 Service Mode to 1.

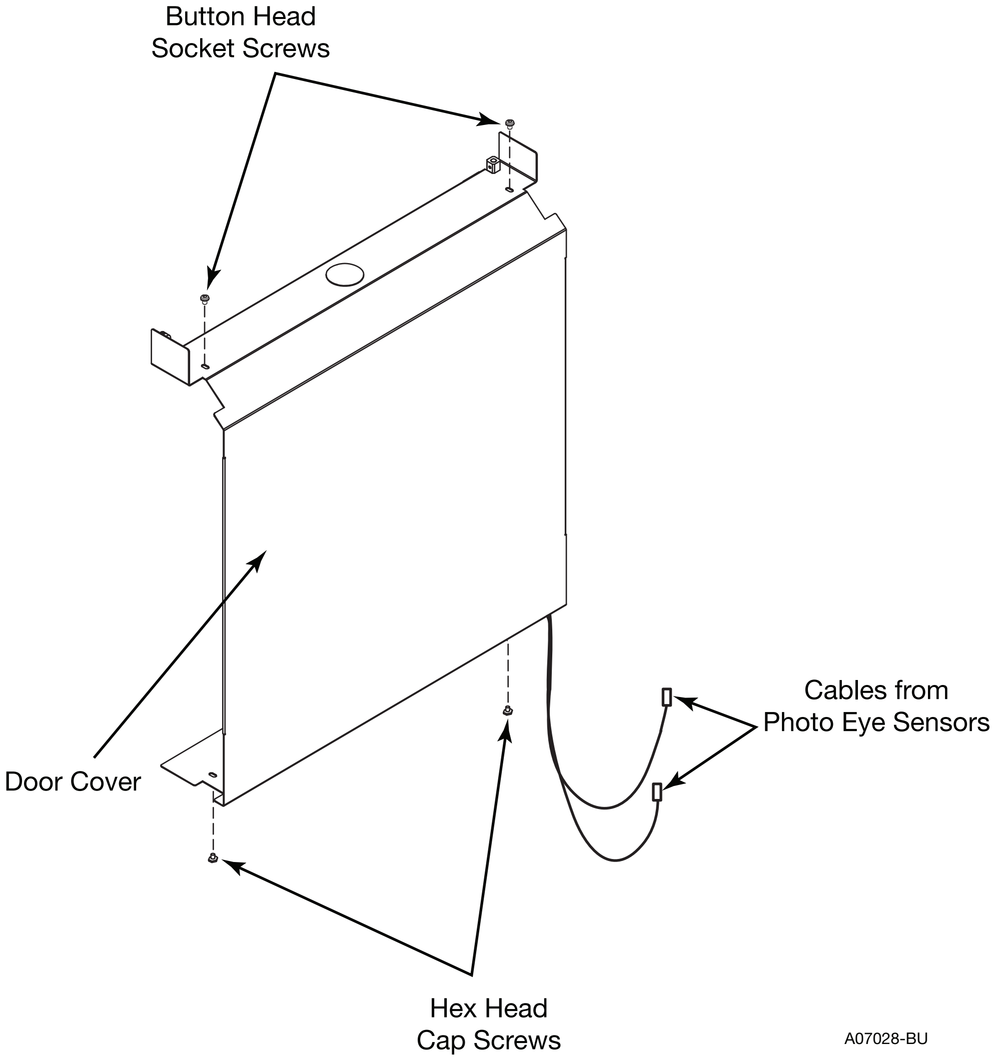
   The *SERVICE MODE* informational message is displayed.

REMOVING THE DOOR COVER

To remove the door cover:

1. Refer to Figure 4–4. Disconnect the photo eye cables from their connectors.

FIGURE 4–4. REMOVING THE DOOR COVER


Button Head
Socket Screws
Cables from
Photo Eye Sensors
Door Cover
Hex Head
Cap Screws
A07028-BU

2. Remove the two button head socket screws and washers that secure the door cover to the standoffs on the top edge of the door plate.

3. Remove the two hex head cap screws and washers that secure the door cover to the standoffs on the bottom edge of the door plate.

MANUAL GASKET RETRACTION

OPENING THE DOOR MANUALLY

The door gasket can be retracted manually if the door cannot be unsealed using the sterilizer controls. The door can also be opened manually when no power is available to the sterilizer. A detailed procedure for retracting the gasket and opening the door is included in the 633HC or 633LS User Manual.

WARNING

AVOID INJURY: Review the warnings in the “Opening the Door Manually” procedure in the User Manual before performing this task. Follow the procedure carefully if you are performing this task for the first time or if you are unfamiliar with the sterilizer piping.

☞ ***NOTE***

Refer to the Piping Package drawing (Figure 7-2, 7-3, or 7-4 depending on the chamber length) for component locations.

Service personnel who have previously performed manual gasket retraction on the 600 Series may use the following abbreviated procedure.

To open the door manually:

1. Turn OFF the steam supply.

2. Turn OFF power to the sterilizer at the power source.

3. Remove the front panels from the sterilizer.

4. Rotate the chamber bleed valve counterclockwise (CCW). This will release residual steam from the chamber.

5. Turn on the water to ejector valve 6SV using the manual override knob.

6. Close the STEAM TO DOOR(S) manual valve.

7. Open the VACUUM TO DOOR(S) manual valve. This will retract the door gasket.

8. Using the spanner wrench provided, rotate the pulley wheel counterclockwise (CCW) until the door is low enough to remove the load.

9. Close the VACUUM TO DOOR(S) manual valve.

10. Open the STEAM TO DOOR(S) manual valve.
11. Turn off water to ejector valve 6SV using the manual override handle.
12. Close the chamber bleed valve by rotating it clockwise (CW).
13. Reinstall the front panels.

PREVENTIVE MAINTENANCE

INSPECTING THE STERILIZER

Perform the following inspection every three months:

1. Verify the exterior panels are clean and can be removed easily. Notify the customer if cleaning is required.
2. Verify the chamber interior is clean. Notify the customer if cleaning is required.
3. Verify the sediment screen and bleed drain guards are in place and free from debris.
4. Verify all labels are in place. See the Label Package drawing in the 600 Series Parts Catalog for locations.
5. Remove the filter screens from the water and steam strainers. See *“Cleaning the Water Strainer” on page 4–19*” and *“Cleaning the Steam Strainer” on page 4–20*. Check for blockages or obstructions. Clean if necessary.

NOTE
When repairing leaks, use Teflon tape on the pipe threads to ensure a good seal.

6. Check the sterilizer piping for steam, water and air leaks. Correct any conditions that might pose a hazard or impair operation of the sterilizer.

CAUTION
Be sure electrical wiring is bundled and routed to avoid contact with steam and hot water piping.

7. Check the electrical connections for tightness. Correct any conditions that might pose a hazard or impair operation of the sterilizer.

CAUTION
Do not overtighten any hardware that attached to an aluminum extrusion. The maximum torque is 15 ft-lbs. Do not use a powered screwdriver to tighten the screws. Excessive force will damage the extrusion.

NOTE
The minimum torque for hardware attached to the aluminum extrusions is 10 ft-lbs.

8. Check hardware for tightness.
9. Check the steam pressure to the door gaskets:
   a. Verify pressure gauge 6P indicates 35 to 40 psi.

   b. Adjust the steam pressure regulator if necessary.

10. Inspect the air-in filters. Replace if necessary.

11. Inspect the water solenoid valve (6SV). Rebuild or replace the solenoid valve every 12 months.

12. Verify the house steam supply is within the pressure range specified on *Figure 6–17, Sheet 3 on page 6–38*.

13. Verify the cold water supply is within the pressure range specified on *Figure 6–17, Sheet 3 on page 6–38*.

14. Review the error log. See *“Diagnostic Messages” on page 8–4* for possible causes of malfunctions.

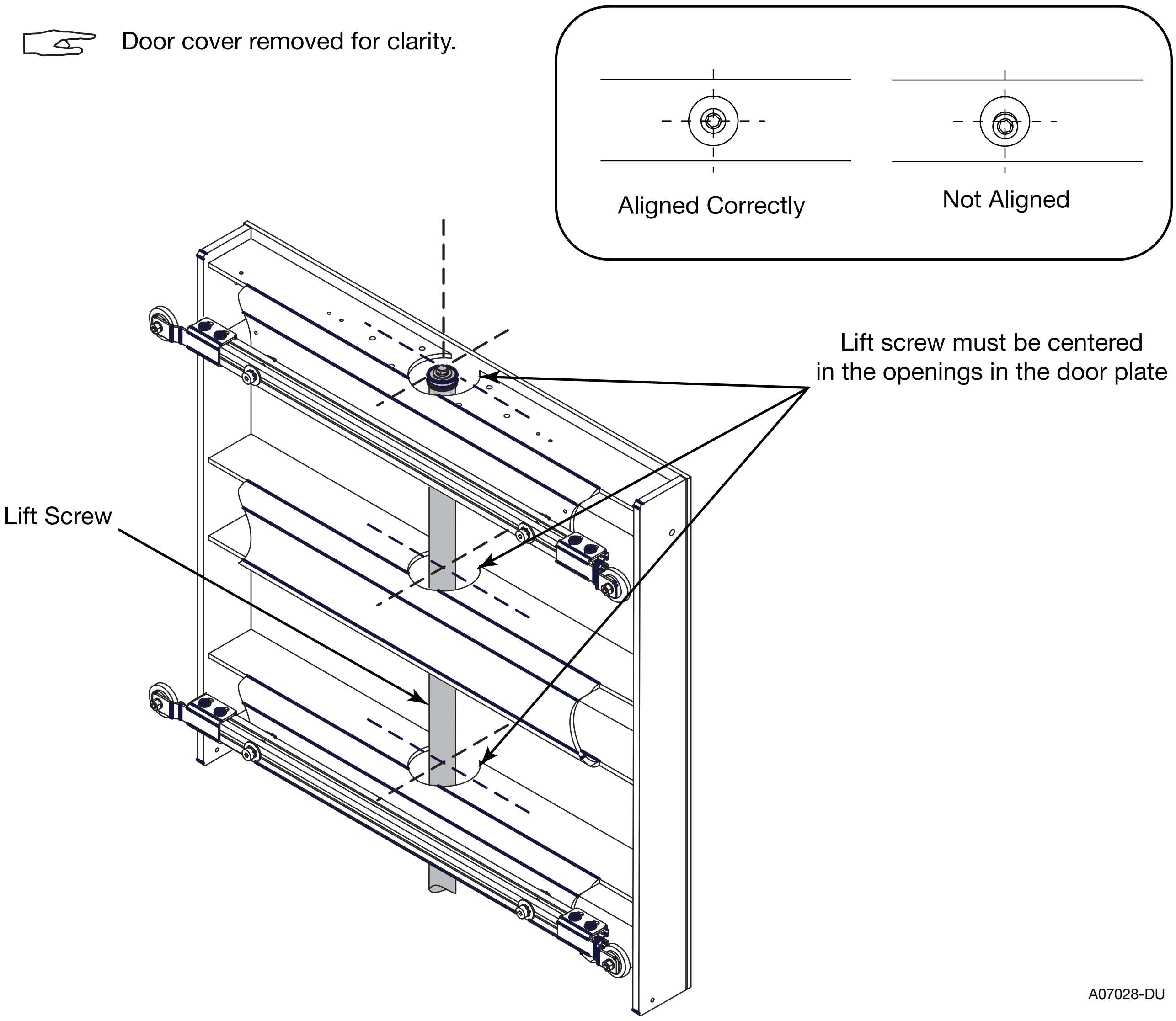
15. Review the printouts for several recent cycles to verify the unit is operating correctly. Check for anomalies in the following areas:
    - length of time for any positive conditioning pulses.
    - length of time for any negative conditioning pulses.
    - length of time to heat up to exposure temperature.
    - temperature control during exposure phase.
    - temperature/pressure correlation during exposure phase.
    - vacuum depth achieved during drying phase or leak test.
    - length of time for air-in phase.
    - typical cycle time.

16. Open and close the door(s):
    - Check for smooth operation and actuation of limit switches.
    - Verify the DOOR(S) CLOSED indicator is functional.

17. Seal and unseal the door(s). Verify the DOOR(S) SEALED indicator is functional.

FIGURE 4–5. LIFT SCREW ALIGNMENT

☞ Door cover removed for clarity.


Aligned Correctly
Not Aligned
Lift screw must be centered in the openings in the door plate
Lift Screw
A07028-DU

18. Check the alignment of the door lift screw:
    a. Remove the plug from the top of the door cover and check that the lift screw is vertically centered in the openings in the door plate.
    b. If the door lift screw is not concentric, see *“Door Alignment” on page 9–32*.
    c. Reinstall the plug.

19. Check the door drive belt for proper tension and excessive wear. Replace the door thrust bearing every three (3) years. See *“Replacing the Pulley bearings” on page 10–34*.

20. Check the door lift screw for dirt and excessive wear. Lubricate the door screw every six (6) months. See *“Lubricating the Door Lift Screw” on page 4–22*.

WARNING

POSSIBILITY OF INJURY: If the door obstruction test (step 21) fails or if the key switch does not disable the door (step 22), the sterilizer should not be used until the problem is corrected. The door obstruction sensors and key switch are safety devices.

21. Test the door obstruction sensors by blocking the infrared beam while the door is moving. The door should stop moving and reverse for two seconds.

22. Turn the key switch to the DISABLE position. Verify the door will not operate. Turn the key switch to the ENABLE position.

23. Check the door gasket for wear or damage. Replace if necessary. See *"Replacing the Door Gasket" on page 4–17*.

WARNING

POSSIBILITY OF INJURY: If the chamber drain float switch does not actuate, the sterilizer should not be used until the problem is corrected. The chamber drain float switch is a safety device.

24. Test the chamber drain float switch:
    a. Pour approximately one gallon of water down the chamber drain.
    b. After approximately five seconds, verify that:
        - the drain opens
        - the ejector turns on
        - the pool of water is evacuated from the floor of the chamber.

25. If the sterilizer is equipped with a rack and extendable shelves:
    a. Verify the rack supports the shelves securely.
    b. Verify the shelves slide freely and do not extend past the stops.

NOTE

Detailed instructions for operating the loading car and transfer carriage are contained in the 633HC or 633LS User Manual.

26. If the sterilizer is equipped for a loading car and transfer carriage:
    a. Verify the transfer carriage wheels roll smoothly and lock properly.
    b. Verify the transfer carriage latches to the sterilizer chamber properly.
    c. Verify the loading car rolls smoothly when pushed into and pulled out of the chamber.

SERVICE
ACCESS REQUIRED

27. Check the control panel(s) and printer:
    - a. Select TEST LEDS/BUZZER from the DIAGNOSTIC service menu See *“DIAGNOSTIC Menu” on page 5–57*.
    - b. Verify the LEDs on the control panel flash and the buzzer sounds.
    - c. Select TEST PRINTER from the DIAGNOSTIC service menu.
    - d. Verify the printer prints out a character test string.
    - e. Verify the paper feed and copy switches on the printer are functional.

TIME SETTINGS
ACCESS REQUIRED

28. Verify the date and time are correct:
    - a. Select CALENDAR from the TIME SETTINGS menu. See *“TIME SETTINGS Menu” on page 5–22*.
    - b. Change the date and time if necessary. See *“Setting the Clock and Calendar” on page 5–22*.

29. Check the ground bonding every 12 months. See *“Inspecting the Ground Bonding” on page 4–24*.

30. If the sterilizer has a GTS-30A or CAS-45A steam boiler:
    - a. Blow down the steam boiler. See *“Blowing Down the Steam Boiler” on page 4–25*.
    - b. Verify the boiler pressure gauge indicates 45 to 55 psi static pressure. Adjust the OPERATING pressure control if necessary. See *“Adjusting the Operating Pressure Control” on page 9–22*.
    - c. Inspect the sight glass for cracks, leaks, and clarity every six (6) months. See *“Inspecting the Boiler Sight Glass” on page 4–26*.
    - d. Clean the water level probes every six (6) months. See *“Cleaning the Boiler Level Probes” on page 4–27*.
    - e. Blow out the pressure control sensing line every six (6) months. See *“Blowing Out the Boiler Pressure Control Line” on page 4–29*.
    - f. Check the boiler water quality:
        - total dissolved solids (TDS) of feedwater.
        - total dissolved solids (TDS) of water within the boiler.

      See *“Checking the Boiler Water Quality” on page 4–31*. If the TDS checks are out of tolerance or the boiler appears rusty, inspect the heating elements and clean them if necessary. See *“Removing the Heating Elements” on page 10–27*.
    - g. Check the heater current every six (6) months. See *“Checking the Boiler Heater Current” on page 4–35*.

   h. Verify the torque values of the boiler hardware every six (6) months. See *“Checking the Boiler Electrical Connections for Tightness” on page 4–32*.

31. If the sterilizer is equipped with a MP-129F Water-Saver:
    a. Check the water-saver piping for leaks.
    b. Check the water temperature in the tank every 12 months. See *“Checking the Water-Saver Temperature” on page 4–36*.

32. If the sterilizer is equipped with a water booster pump:
    a. Check the cold water piping for leaks.
    b. Check the dynamic pressure of the cold water supply entering the sterilizer water strainer. The cold water supply must meet the requirements specified on *Figure 6–17, Sheet 3 on page 6–38*.

33. If the sterilizer is equipped with a uninterruptible power supply (UPS), test the UPS. See *“Testing the UPS” on page 4–37*.

34. If piping components were rebuilt or replaced, or if piping leaks were repaired, run a vacuum leak test cycle. Verify the sterilizer passes the leak test and there are no visible steam or water leaks.

NOTE
If the sterilizer fails the Bowie and Dick test, check for water or steam leaks.

35. Run a Bowie and Dick test cycle:
    a. Connect a calibrated pressure meter (see *“Pressure meter” on page C–1* for specifications) to the test connection in the pressure transducer piping.
    b. Select the DETAILS process screen.
    c. Follow the instructions on the S.M.A.R.T Pack.
    d. During the cycle, compare the pressure indicated on the process display with the pressure measured by the pressure meter. If the pressure indicated on the process display is not within ±2 psi of the measure value, replace the pressure transducer.
    e. Verify the CHAMBER pressure gauge on the control panel(s) is within ±2 psi of the displayed value.
    f. At 3 minutes (3:00) into the exposure phase, check the steam table difference displayed on the DETAILS process screen. If Steam Table Diff is not within ±0.6 psi, calibrate the temperature sensors See *“Calibration” on page 9–1*.
    g. After the cycle is completed, verify the cycle and phase times did not change by more than 10% from the previous preventive maintenance inspection.

36. Test the jacket pressure relief valve. See *“Checking the Pressure Relief Valve” on page 4–21*.

MAINTENANCE SCHEDULE

Items that require periodic maintenance are listed in Table 4–1.

TABLE 4–1. PREVENTIVE MAINTENANCE SCHEDULE

Item	Recommended Frequency	See Page
Sterilizer		
Replace door gasket	When Required	4–17
Replace air-in filters		4–19
Clean water strainer	3 Months	4–19
Clean steam strainer		4–20
Check pressure relief valve		4–21
Lubricate door lift screw	6 Months	4–22
Install PM packages	12 Months	4–23
Inspect ground bonding		4–24
Replace door thrust bearing	3 Years	10–34
Steam Boiler		
Inspect sight glass	6 Months	4–26
Clean level probes		4–27
Blow out pressure control line		4–29
Check boiler water quality		4–31
Check tightness of electrical connections		4–32
Check heating element current		4–35
Water-Saver		
Check tank temperature	12 Months	4–36
Uninterruptible Power Supply (UPS)		
Test UPS	3 Months	4–37

PREVENTIVE MAINTENANCE (PM) PACKAGES

There are two types of preventive maintenance parts packages: valve rebuild and valve replacement. Both types of packages include all the parts needed for yearly maintenance. Parts packages for the upper piping and lower piping are available separately.

☞ ***NOTE***
Solenoid valves and check valves can only be rebuilt three times before a complete replacement is necessary.

The replacement PM package includes solenoid valves, check valves, steam traps, air-in filters, and strainer screens. The rebuild packages include solenoid and check valve rebuild kits, steam traps, air-in filters, and strainer screens.

TABLE 4–2. PREVENTIVE MAINTENANCE PACKAGES

PM Package	Part No.
PM PKG,REBUILD,VALVES,UPR,600	61301607459
PM PKG,REBUILD,VALVES,LWR,600	61301607460
PM PKG,REPLACE,VALVES,UPR,600	61301607461
PM PKG,REPLACE,VALVES,LWR,600	61301607462

MAINTENANCE PROCEDURES

REPLACING THE DOOR GASKET

Tools and Materials:

- blunt tool suitable for prying the gasket out of the headring
- isopropyl alcohol for cleaning the headring groove
- shop cloth

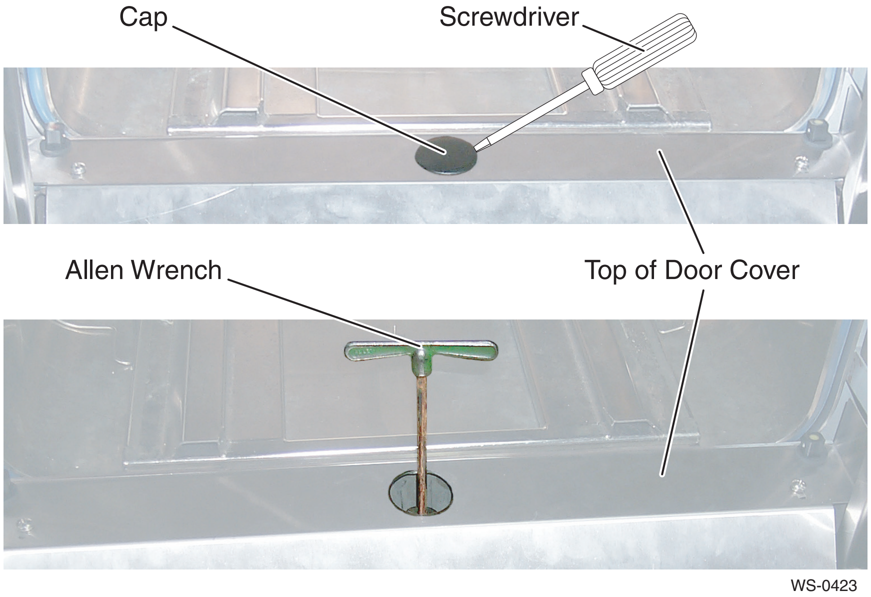
☞ ***NOTE***

See "Consumable Stock" on page 7–22 for door gasket part number.

To replace the door gasket:

1. Open the sterilizer door.
2. Use a screwdriver to pry up and remove the cap from the top of the door cover.

FIGURE 4–6. LOWERING THE DOOR TO REPLACE THE DOOR GASKET



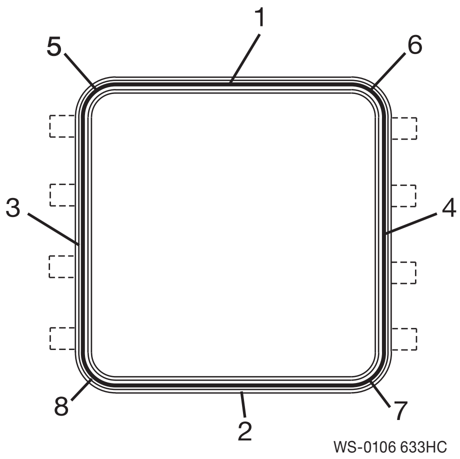
3. Use an Allen wrench to lower the door below the level of the gasket.
4. Use a blunt instrument to lift the gasket out of the headring gasket groove until you can grasp the gasket with your fingers.
5. Remove the gasket by pulling it out of the headring gasket groove.
6. Remove the spring in the same manner as removing the gasket taking care not to let the spring snap.

7. Clean the gasket groove with alcohol to remove any foreign material collected in the groove.

8. Press the spring into the center of the gasket groove overlapping the two ends approximately 6 inches at the top of the headring groove.

9. Ensure the replacement door gasket is clean.

FIGURE 4–7. REPLACING THE DOOR GASKET



10. Install the door gasket:
    a. Press the gasket into the center of the gasket groove at the top of the headring. (Callout 1)
    b. Press the gasket into the center of the gasket groove at the bottom of the headring. (Callout 2)
    c. Press the gasket in the headring on both sides, then the four corners. (Callouts 3 and 4)
    d. Press the gasket into the headring on the top corners. (Callouts 5 and 6)
    e. Press the gasket into the headring on the bottom corners. (Callouts 7 and 8)

11. Make sure that the gasket is fully recessed to prevent damage to the door.

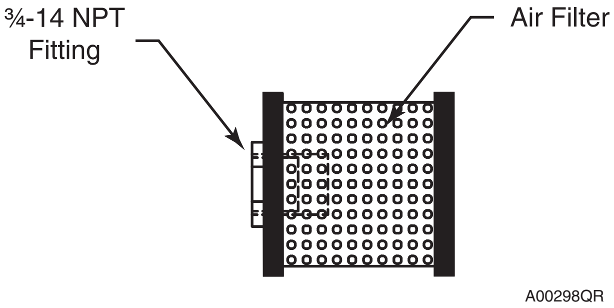
12. Install the cap that was removed in step 2, in the top of the door cover.

13. Press [UNSEAL] to pull the gasket in completely.

REPLACING THE AIR-IN FILTERS

Two air filters provide a filtration rate of 99.97% efficiency for 0.3 micron particles and droplets. Replace the air-in filters after an AIR-IN SLOW diagnostic message. The filters have a threaded NPT fitting and need to be hand-tightened only.

FIGURE 4–8. AIR FILTER



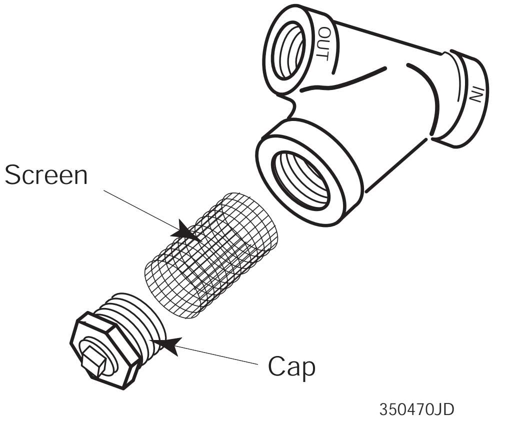
To replace an air-in filter:

1. Unscrew the used filter.
2. Screw the replacement filter hand-tight.

CLEANING THE WATER STRAINER

The strainer screen can be removed by unscrewing the cap as shown in Figure 4–9.

FIGURE 4–9. REMOVING THE STRAINER SCREEN



To clean the water strainer:

1. Shut off the water supply line.

NOTE
View the pressure gauge while dissipating the water pressure. Wait until the gauge reads zero (0 psig) before unscrewing the strainer cap.

2. Dissipate the water pressure.
3. Unscrew the cap.

4. Remove the screen.

5. Clean the screen thoroughly by back flushing the screen with water and using a brush to remove any particles.

6. Reassemble and check for leaks.

CLEANING THE STEAM STRAINER

To clean the steam strainer:

1. Shut off the steam supply line.

WARNING

BURN HAZARD: All steam lines are HOT! When cleaning the steam strainer, prevent burns by avoiding contact with the lines until the lines are cool.

BURN HAZARD: View the pressure gauge while dissipating the steam pressure. Wait until the gauge reads zero (0 psig) before unscrewing the strainer cap.

---

2. Dissipate the steam pressure.

3. Let the steam lines cool before proceeding with the next step.

4. Unscrew the cap (*see Figure 4–9 on page 4–19*).

5. Remove the screen.

6. Clean the screen thoroughly by back flushing the screen with water and using a brush to remove any particles.

7. Reassemble and check for leaks.

CHECKING THE PRESSURE RELIEF VALVE

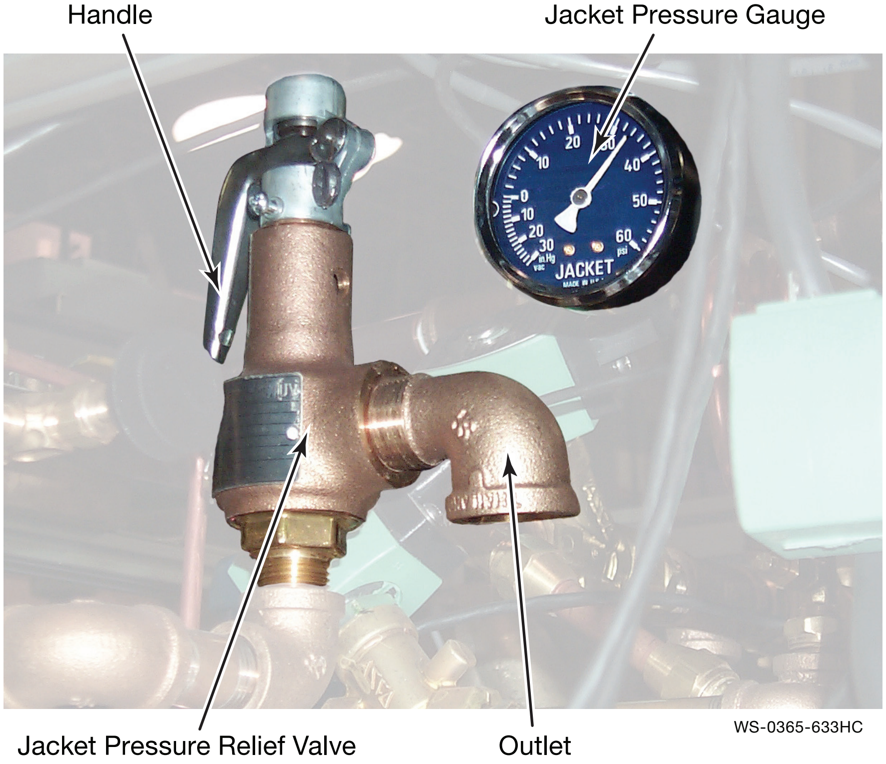
The 600 Series sterilizers have a single jacket pressure relief valve, which needs to be checked periodically. The jacket pressure relief valve is located in the upper piping and has a pressure gauge attached.

WARNING

BURN HAZARD: Keep away from the outlet (discharge) end of the pressure relief valve when operating the pressure release handle.

HOT SURFACES: The handle on the pressure relief valve may be hot. Wear protective gloves when operating the valve.

FIGURE 4–10. PRESSURE RELIEF VALVE



To check the pressure relief valve:

1. Read the instructions on the tag attached to the handle of the pressure relief valve.
2. When the jacket pressure exceeds 33 psig, operate the pressure release handle of the valve to ensure functioning of all moving parts.

LUBRICATING THE DOOR LIFT SCREW

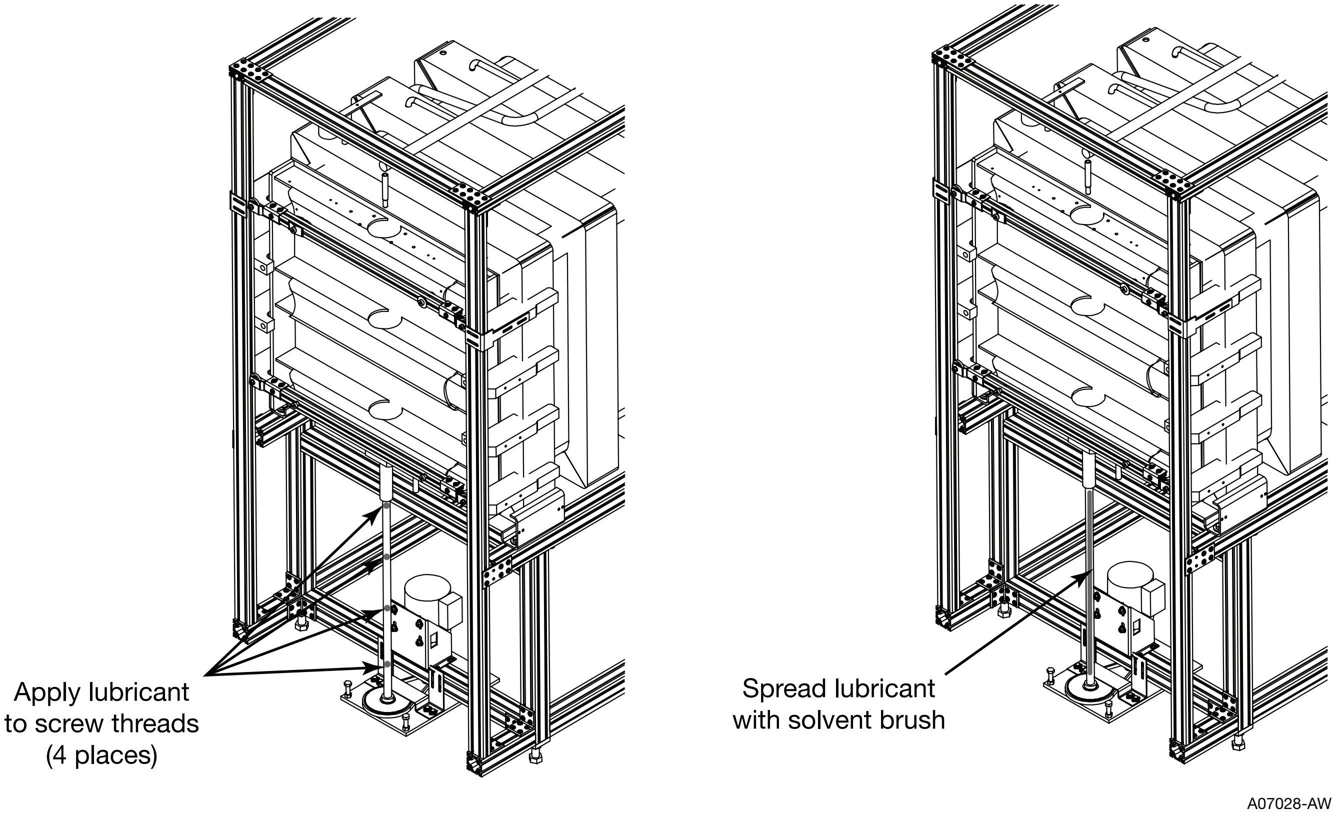
Tools and Materials:

- synthetic lubricant (see *“Consumable Stock” on page 7–22*)
- solvent brush
- shop cloth

To lubricate the lift screw:

1. Clean off any old lubricant and dirt with a shop cloth.
2. Squeeze a bead of lubricant at four locations along the length of the lift screw.

FIGURE 4–11. LUBRICATING THE LIFT SCREW


Apply lubricant to screw threads (4 places)
Spread lubricant with solvent brush
A07028-AW

3. Spread the lubricant with a solvent brush.
4. Operate the door several times to distribute the lubricant.

INSTALLING THE PM PACKAGES

Table 4–3 is a cross-reference of the solenoid valves (identified by reference designator), replacement valves, and rebuild kits. Refer to *Figure 6–2 on page 6–4* for valve identification.

TABLE 4–3. SOLENOID VALVE REBUILD KITS

Reference Designator	Function	Complete Valve	Rebuild Kit
1SV 8SV	Steam to Chamber Steam to Jacket	61301603374	54186
10SV 12SV	Steam to Door(s) Vacuum to Door(s)	61301601697	61301601739
2SV 3SV	Chamber Drain Chamber Air-In	61301601701	61301600443
14SV	Secondary Drain	61301601700	61301601742
5SV/6SV	Water to Ejector	61301601696	61301601738

NOTE

Refer to the Piping Package drawing (Figure 7-2, 7-3, or 7-4 depending on the chamber length) for component locations.

On 26 inch units, water to ejector valve 5SV/6SV and water strainer 2ST are located in the lower piping. Replacement parts for these components are included in the upper piping PM package.

To install the PM packages:

1. Install the PM package for the upper piping:
   a. Rebuild or replace the solenoid valves:
      - steam to chamber 1SV
      - air-in 3SV
      - water to ejector 5SV/6SV
      - steam to jacket 8SV
      - steam to door(s) 10SV
   b. Rebuild or replace the check valves:
      - steam to jacket 1CV
      - air-in 6CV
   c. Replace the air-in filters.
   d. Replace the steam supply trap 2TR.
   e. Replace the strainer screens:
      - steam supply 1ST

    - cold water supply 2ST

2. Install the PM package for the lower piping:
    1. Rebuild or replace the solenoid valves:
        - chamber drain 2SV
        - vacuum to door(s) 12SV
        - secondary drain 14SV
    2. Rebuild or replace the check valves:
        - secondary drain 2CV
        - vacuum to door(s) 3CV
        - chamber bleeds 4CV
        - chamber drain 5CV
        - chamber trap 7CV
    3. Replace the steam traps:
        - jacket bleeds 1TR
        - chamber 3RT

INSPECTING THE GROUND BONDING

The voltage difference between the power box chassis and the ground terminal must not exceed 3 Vac.

WARNING
Observe electrical safety precautions to avoid contact with live components when working inside the power box.

Tools and Materials:

- voltmeter

To inspect the ground bonding:

1. Open the cover of Power Box 1A.
2. Check that the ground wire is present. If the ground wire is not present, notify the appropriate site personnel.
3. Check that the connections are tight.
4. Using a calibrated multimeter, set the meter to the AC voltage setting.
5. Connect the black lead to the terminal 1TB3 (ground).
6. Place the red lead on the surface of the power box.
7. Verify that the voltage difference is not more than 3 Vac.

BLOWING DOWN THE STEAM BOILER

The steam boiler must be blown down regularly to remove mineral deposits and loose scale. A detailed procedure for blowing down the boiler is included in the 633HC or 633LS User Manual.

WARNING
BURN HAZARD: The drain valve is hot. Wear protective gloves.

NOTE
Refer to the Piping Package drawing (Figure 7-2, 7-3, or 7-4 depending on the chamber length) and Steam Boiler drawing (Figure 7-5 or 7-6 depending on the boiler model) for component locations.

This procedure does not apply to units with the automatic blow-down package.

Follow the procedure in the User Manual if you are performing this task for the first time of if you are unfamiliar with the sterilizer piping. Service personnel who have previously performed manual blow-down may use the following abbreviated procedure.

To manually blow down the steam boiler:

1. Turn OFF the sterilizer controls.
2. If the sterilizer has a cabinet, remove the left side panel to allow access to the steam boiler. Lift the panel up and out.
3. Turn OFF the power switch on the steam boiler.
4. Use the knob on water solenoid valve 6SV to open the valve. Turn to the open position as indicated on the valve housing.
5. While the boiler is at full steam pressure, open the manual drain valve for approximately 10 seconds to remove any mineral deposits and loose scale. Keep the valve open just until the sight glass is empty.

NOTE
It is not necessary to completely drain the water from the boiler. The more water you drain from the boiler (that is, the longer the drain valve is open), the longer it takes for the sterilizer to recover and begin normal operations.

You may need to adjust the time based upon the results of cleaning the heating elements during maintenance.

6. As soon as the sight glass is empty, close the manual drain valve.
7. Turn ON the sterilizer controls.

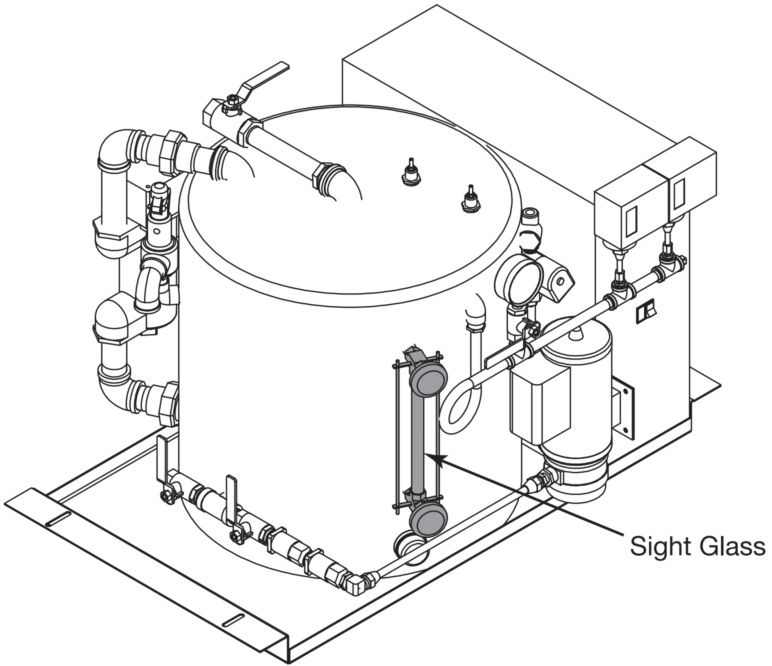
8. Turn ON the steam boiler switch to bring the water supply up to the operating level.

9. Use the white handle connected to water solenoid valve 6SV to close the valve. Push in on the handle while turning it to the closed position.

INSPECTING THE BOILER SIGHT GLASS

The sight glass is protected from breakage by two retaining rods. It is secured to the top and bottom gauge valves by hex compression nuts.

FIGURE 4–12. BOILER SIGHT GLASS



WARNING
AVOID INJURY: Wear safety glasses and gloves when removing the sight glass. The sight glass is easily broken.

To inspect the sight glass:

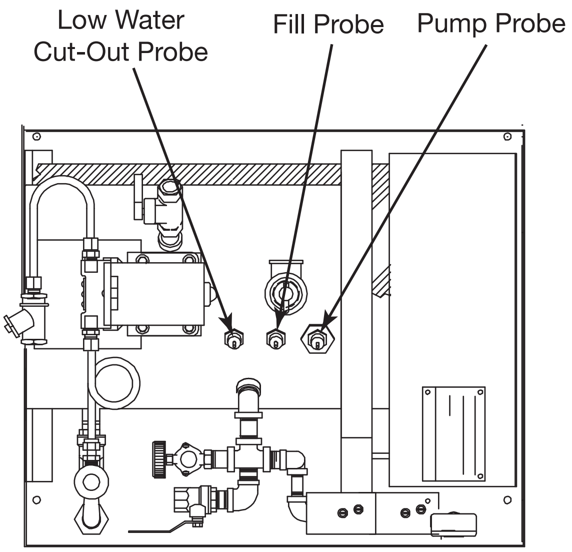
1. Inspect the sight glass and O-rings for cracking or leaks.

2. If the sight glass needs to be replaced, see *“Removing the Sight Glass” on page 10–26*.

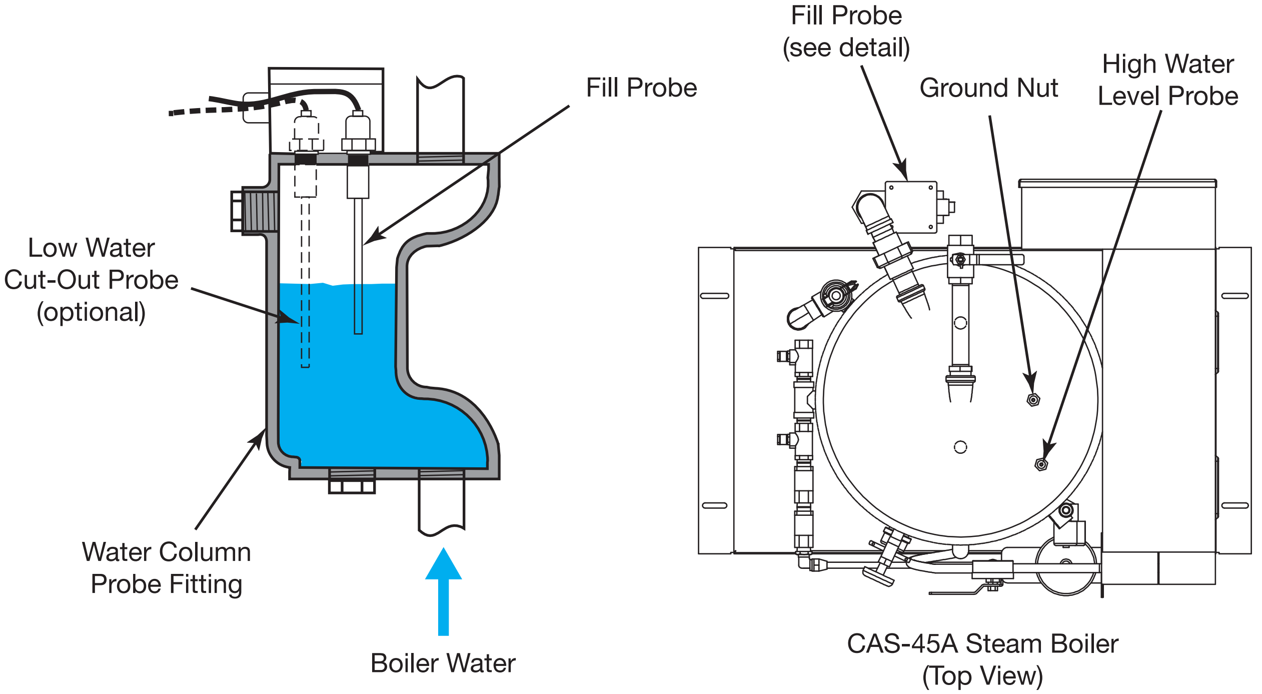
CLEANING THE BOILER LEVEL PROBES

The boiler level probes are identified in Figure 4–13.

FIGURE 4–13. WATER LEVEL PROBES


Low Water
Cut-Out Probe
Fill Probe
Pump Probe

GTS-30A Steam Boiler
(Top View)


Fill Probe
Low Water
Cut-Out Probe
(optional)
Water Column
Probe Fitting
Boiler Water
Fill Probe
(see detail)
Ground Nut
High Water
Level Probe

CAS-45A Steam Boiler
(Top View)

A07028-G

NOTE

The water level probes should be removed and cleaned every time the heating element assemblies are removed and cleaned.

If a probe needs to be replaced, replace the entire assembly (probe and isolator).

Tools and Materials:

- spark plug wrench or 13/16 in. deep-well socket wrench
- Teflon tape or pipe joint compound

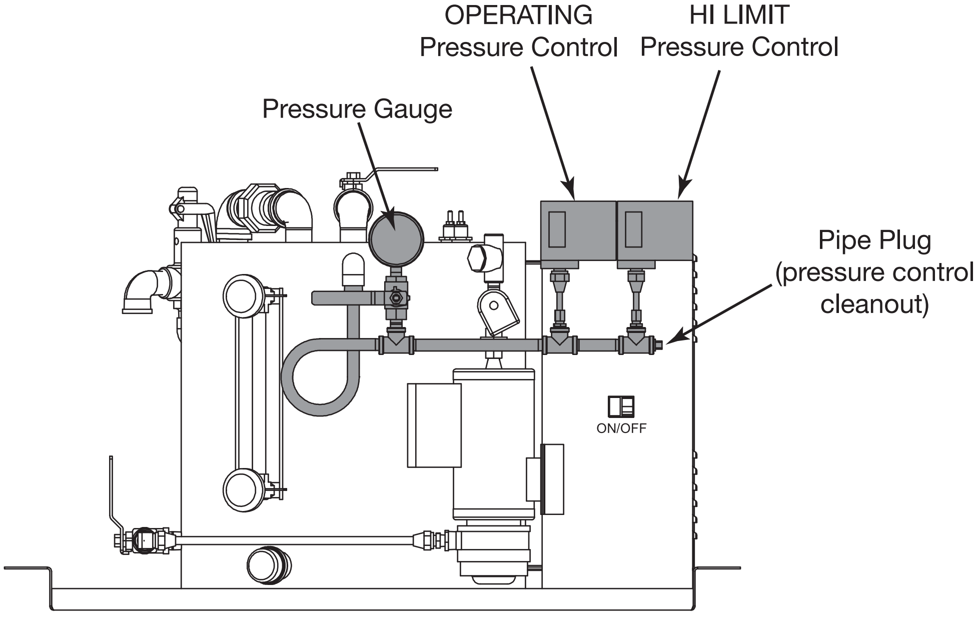
To remove and clean the water level probes:

1. Turn OFF all power to the steam boiler.
2. Disconnect the wire and remove the probe/isolator assembly with a spark plug wrench or 13/16 in. deep-well socket wrench.
3. Remove the bottom plug from the probe isolator.
4. Clean the inside and outside of the isolator. Clean the isolator by wiping it with a cloth.
5. Rinse thoroughly with water. Be sure the 1/8 in. holes at the top and bottom of the isolator are free of scale.
6. Apply Teflon tape or a suitable pipe compound to the probe fitting threads, because they are high-pressure connections.
7. Reinstall the probe/isolator assembly.
8. After the boiler is placed back in operation, check for leaks.

BLOWING OUT THE BOILER PRESSURE CONTROL LINE

The pressure control line may be cleaned out by removing the pipe plug and inserting a long rod into the pressure control piping. For a more thorough cleaning, the pressure control line should be blown out.

FIGURE 4–14. PRESSURE CONTROL LINE


OPERATING
Pressure Control
HI LIMIT
Pressure Control
Pressure Gauge
Pipe Plug
(pressure control
cleanout)
ON/OFF

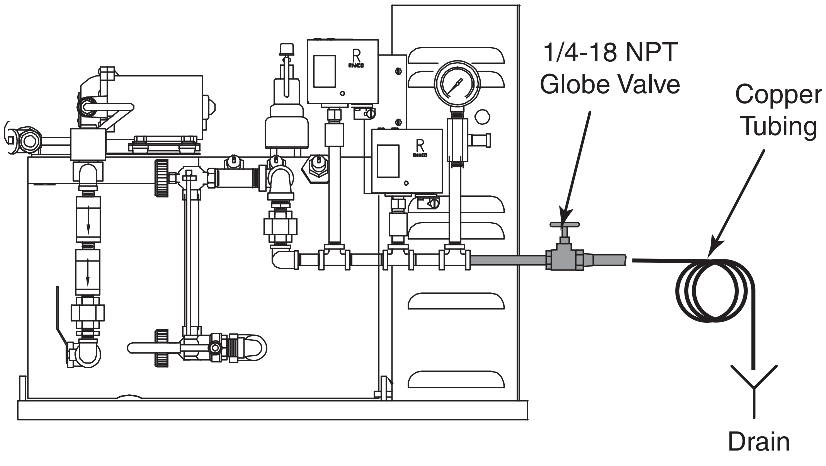
CAS-45A Steam Boiler

A07028-AX

Tools and Materials:

- 1/4-18 NPT globe valve
- copper tubing to discharge the steam to a drain (see Figure 4–15)

FIGURE 4–15. BLOW-OUT SETUP


1/4-18 NPT
Globe Valve
Copper
Tubing
Drain

GTS-30A STEAM BOILER

A07028-AS

WARNING

BURN HAZARD: The pressure control piping is hot. Wear protective gloves.

Be sure the boiler pressure gauge reads zero (0 PSIG) before removing the pipe plug.

BURN HAZARD: Be sure the boiler pressure gauge reads zero before attaching and removing the globe valve.

Always remove the globe valve after blowing out the pressure control line. Leaving the globe valve attached to the boiler is in violation of the ASME Boiler and Pressure Vessel Code.

☞ ***NOTE***

The blow-out setup uses a globe valve because of its slow-acting mechanism. Ball valves are fast-acting and are not suitable for this application.

To blow out the pressure control piping:

1. Connect the pressure control blow-down valve:
   a. Turn OFF the boiler and allow it to cool.
   b. Remove the pipe plug from the tee below the pressure gauge.
   c. Connect the 1/4-18 NPT globe valve to the tee.
   d. Connect copper tubing to the globe valve and place the other end in a drain where the steam can be safely discharged.
2. Turn ON the boiler and allow it to reach operating pressure.
3. Turn OFF the sterilizer controls.
4. Turn OFF the boiler power switch.
5. Open the globe valve for several seconds.

   Steam is discharged through the globe valve and tubing.
6. Allow the boiler to cool down until the boiler pressure gauge reads 0 PSIG.
7. Remove the globe valve and reinstall the pipe plug.

CHECKING THE BOILER WATER QUALITY

Tools and Materials:

- TDS meter—see Appendix C

To test the boiler water quality:

1. Take a sample of the feedwater to the boiler. The total dissolved solids (TDS) should not exceed the feedwater quality specification on the roughing-in drawing.

2. Take a sample of the water from the boiler drain. The total dissolved solids (TDS) should not exceed 3500 ppm.

3. If the TDS of the water inside the boiler is excessive, more frequent blow down is recommended.

   The following table provides more detailed information.

TABLE 4–4. RECOMMENDED LIMITS WITHIN A BOILER

Total dissolved solids, ppm	3500
Total alkalinity, ppm	850
Suspended solids, ppm	300
Silica (SiO2), ppm	125
Sulfite (SO3), ppm	25—50
Phosphate, ppm	30—60
P-Alkalinity as CaCO3, ppm	900
Iron, ppm	2

CHECKING THE BOILER ELECTRICAL CONNECTIONS FOR TIGHTNESS

Tools and Materials:

- adjustable torque wrench/driver set with 20, 45, and 110 in-lb settings

---

WARNING

FIRE HAZARD: Loose electrical connections may result in an electrical fire. When performing periodic maintenance, check that the heating elements, element flange bolts, contactors, and three-phase supply terminal block are torqued to the values specified in Figure 4–16, Sheet 1 on page 4–33 or Figure 4–16, Sheet 2 on page 4–34.

To check the electrical connections:

1. Turn OFF power to the boiler at the source. Lock out/tag out the mains disconnect.

2. Allow the boiler to cool down.

3. Remove the cover panel from the boiler electrical cabinet.

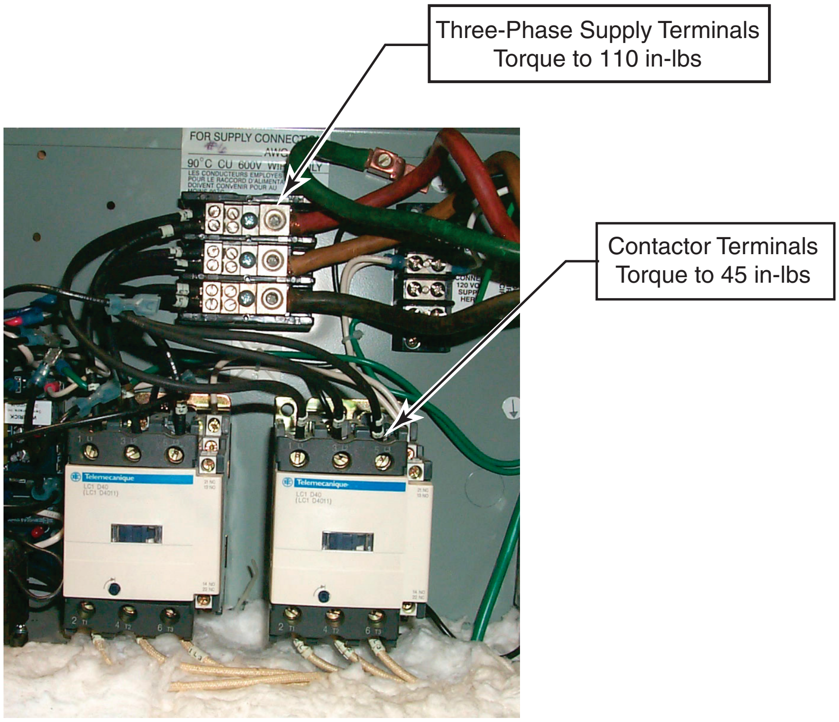
4. Refer to *Figure 4–16, Sheet 1 on page 4–33* or *Figure 4–16, Sheet 2 on page 4–34*. Tighten the three-phase supply terminals to the specified torque.

5. Tighten the heater contactor terminal to the specified torque.

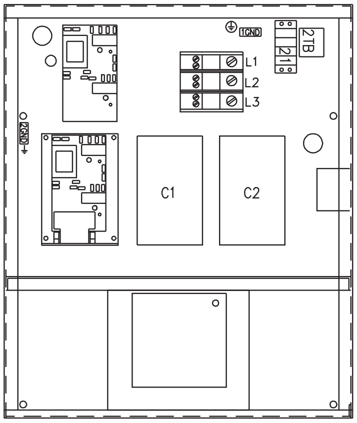
6. Tighten the heating element flange bolts and terminals to the specified torque.

7. Reinstall the cover panel.

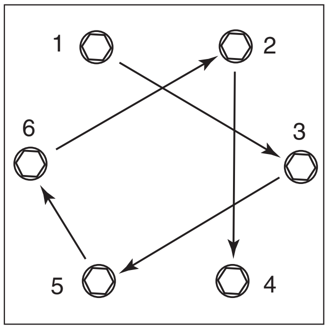
FIGURE 4–16, SHEET 1. TORQUE SPECIFICATIONS (GTS-30A)


Three-Phase Supply Terminals
Torque to 110 in-lbs

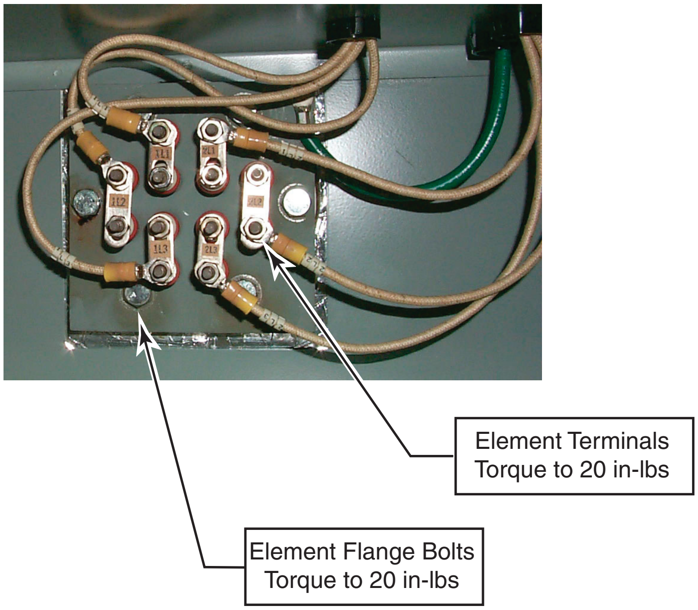
Contactor Terminals
Torque to 45 in-lbs



ELECTRICAL CABINET



FLANGE BOLT TIGHTENING SEQUENCE
(Heating elements not shown for clarity)

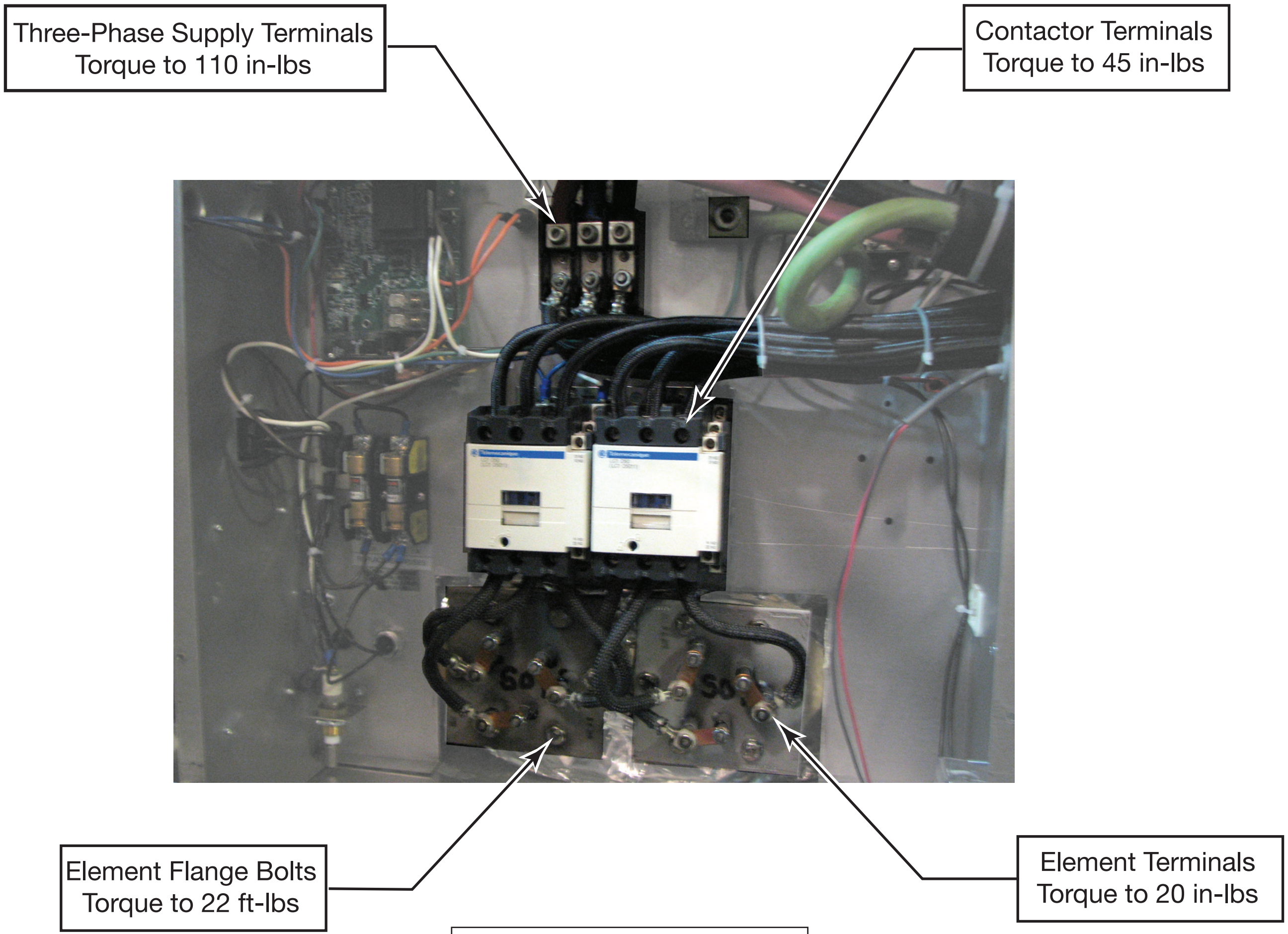

Element Terminals
Torque to 20 in-lbs

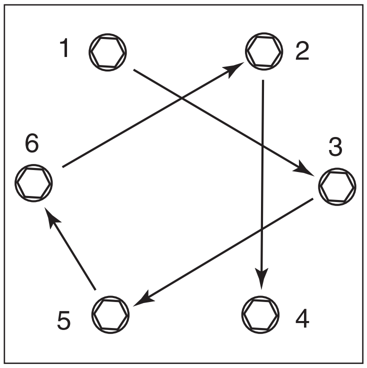
Element Flange Bolts
Torque to 20 in-lbs

GTS-30A STEAM BOILER

A07027-CB

FIGURE 4–16, SHEET 2. TORQUE SPECIFICATIONS (CAS-45A)


Three-Phase Supply Terminals
Torque to 110 in-lbs
Contactor Terminals
Torque to 45 in-lbs
Element Flange Bolts
Torque to 22 ft-lbs
Element Terminals
Torque to 20 in-lbs


1
2
6
3
5
4

FLANGE BOLT TIGHTENING SEQUENCE
(Heating elements not shown for clarity)

A07027-BX

CHECKING THE BOILER HEATER CURRENT

Tools and Materials:

- clamp-on ammeter

WARNING

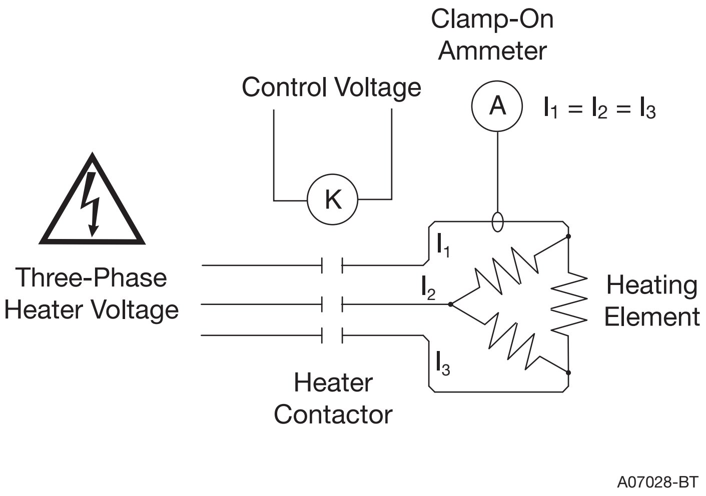
SHOCK HAZARD: This procedure should only be performed by persons trained in measuring alternating current (AC).

SHOCK HAZARD: Observe electrical safety precautions to avoid contact with live components when working inside the electrical cabinet.

NOTE

Refer to the Steam Boiler specification drawing in Section 6 for heater wiring diagrams.

FIGURE 4–17. MEASURING THE HEATER CURRENT


Clamp-On Ammeter
Control Voltage
A
$I_1 = I_2 = I_3$
K
I_1
I_2
I_3
Three-Phase Heater Voltage
Heating Element
Heater Contactor
A07028-BT

To check the heater current:

1. Remove the access panel from the boiler electrical cabinet.
2. Attach the clamp-on ammeter to one of the leads to the heating elements.
3. Turn on the electrical power and measure the current draw of the lead.
4. Measure the current draw of the other leads.
5. The current draw should be equal for all three-phases. If not, replace the defective heating element(s).

CHECKING THE WATER-SAVER TEMPERATURE

Tools and Materials:

- digital thermometer

1. Remove the large plug on the top of the tank.
2. Turn on the hot and cold water lines. Using the digital thermometer set for °F, place the thermocouple in the stream of the incoming water.

   The temperature should read 120°F or greater.
3. Adjust the thermocouple to be approximately halfway down into the tank.
4. When the tank is approximately three-fourths (3/4) full, the solenoid valve (cold water supply) should be adding cool water to the tank. Observe the flow of water into the tank from the valve.
5. Turn off the hot water supply to the tank.

   As the water is cooled, the solenoid valve should de-energize (check with screwdriver).
6. Using the digital thermometer, take the temperature of the water in the tank.

   The water temperature should be less than 115°F.

TESTING THE UPS

To test the UPS:

1. Press the Power Off button on the UPS.

   Verify the green AC mode indicator is flashing.

2. Press the Power On button on the UPS.

   Verify the green AC mode indicator glows steadily.

NOTE
The AC mode indicator contains both red and green LEDs. If either LED is flashing, the UPS is in buck or boost mode to compensate for fluctuations in line voltage. This is a normal operating condition.

---

3. Turn OFF the mains disconnect to interrupt the power to the sterilizer.

   Verify the battery mode indicator is lit and the UPS beeps slowly when it is providing backup power to the sterilizer.

NOTE
If the UPS starts beeping faster and the battery service indicator is lit, the battery needs to recharge.

---

4. Turn ON the mains disconnect to restore power.

SECTION 5 SERVICE FUNCTIONS

INTRODUCTION

WARNING

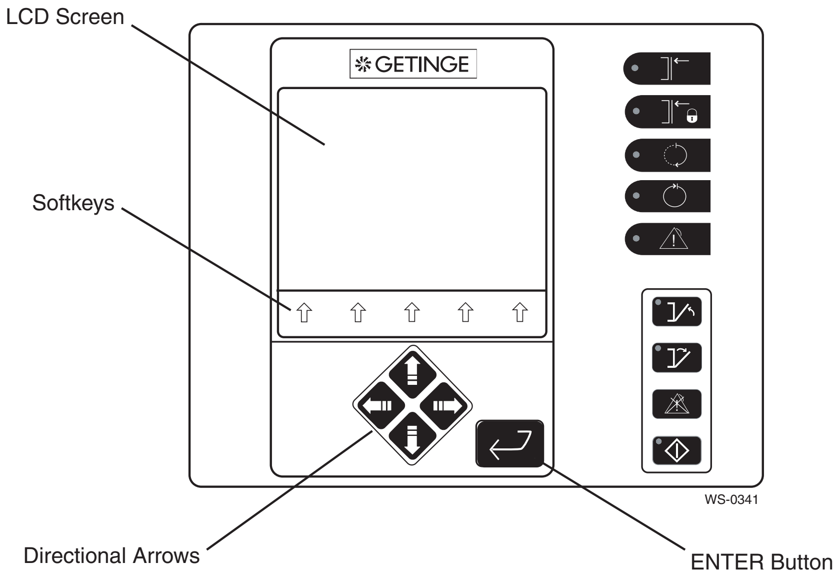
RISK OF INEFFECTIVE CYCLES AND OPERATOR INJURY. Do not attempt to use an unauthorized software security code to tamper with the controls during the installation or service of this equipment. Whenever a problem cannot be corrected using authorized software security codes, contact Getinge USA Technical Services personnel. Tampering by any means, to include the use of an unauthorized software security code, could constitute termination of employment with Getinge USA, Inc., and could be a violation of Federal law.

The section contains:

- A list of tasks that can be performed using the service menu
- Instructions on how to navigate the display and enter information
- A description of the three softkeys available from the process screen: [SETUP], [SELECT CYCLE], and [PARAMETERS]
- A description of the SYSTEM MENU and its submenus.

The display panel consists of the LCD screen, five function buttons (softkeys), directional arrows, and ENTER button.

FIGURE 5–1. DISPLAY PANEL



PASSWORD ACCESS AREAS

The password access areas and the display screens that are associated with them are listed in Table 5–1.

☞ ***NOTE***
Access areas that require a supervisor password are shaded in light gray; access areas that require a service password are shaded in medium gray.

TABLE 5–1. PASSWORD ACCESS AREAS AND DISPLAY SCREENS

Access Letter	Access Area	Access Level	Screens	See Page
A	Parameter Setting	Supervisor	VIEW PARAMETERS	5–19
B	Calendar and Alarm Clock	Supervisor	CALENDAR ALARM CLOCK	5–22 5–24
C	Calibration	Service	MANUAL CALIBRATION AUTOMATIC CALIBRATION	5–28 5–29
D	Boolean Password	Programmer	—	—
E	Service	Service	ERROR LOG TEST ANALOG IN TEST ANALOG OUT TEST DIGITAL IN TEST DIGITAL OUT TEST SYSTEM FLAG TEST USER FLAG TEST PRINTER TEST LED/BUZZER	5–56 8–19 — 8–20 8–22 8–26 8–27 8–28 8–28
F	Hardware Setup	Service	DIPSWITCHES	5–49
G	Configuration	Supervisor	EDIT CYCLES MACHINE NAME LANGUAGE DATE UNITS PANEL SETUP EXTENDED PARAMETERS	5–36 5–38 5–39 5–41 5–43
H	System Definition	Programmer	—	—
I	Boolean Code	Programmer	—	—
J	Password Setup	Supervisor	PASSWORDS	5–45
K	Documentation	Service	PRINTOUT CYCLE PRINTER CONFIGURE PRINTER LOG VALUES	5–31 5–32 5–33
L	Boolean Password	Programmer	—	—

WHAT YOU CAN DO FROM THE DISPLAY PANEL

Tasks that can be performed from the display panel, along with the menu path are listed in Table 5–2.

NOTE
Most tasks require a password with a specific access level. Tasks that require a supervisor password are shaded in light gray; tasks that require a service password are shaded in medium gray.

TABLE 5–2. DISPLAY PANEL TASKS

TASK	SOFTKEY	MENU PATH	PAGE
Selecting the Details Screen	[SETUP]	Not Applicable	5–12
Selecting the Plot Graph Screen			5–12
Selecting the Bar Graph Screen			5–13
Accessing the SYSTEM MENU			5–14
Viewing the ABOUT Screen			5–15
Adjusting the Display Brightness			5–15
Selecting a Cycle	[SELECT CYCLE]	Not Applicable	5–16
Editing the Cycle Parameters (Quick Edit)	[PARA-METERS]	Not Applicable	5–17
Editing the Cycle Parameters (Full Edit)			5–18
Setting the Clock and Calendar	[SETUP]	SYSTEM MENU > TIME SETTINGS > CALENDAR	5–22
Setting the Auto Blow-Down Time		SYSTEM MENU > TIME SETTINGS > ALARM CLOCK	5–23
Setting the Utilities Control Times			5–25
Bypassing Utility Shutdown Mode	—	Press START while UTILITY SHUTDOWN is displayed.	5–26
Calibrating the Analog Inputs (Manual Method)	[SETUP]	SYSTEM MENU > CALIBRATION > MANUAL	5–28
Calibrating the Analog Inputs (Automatic Method)		SYSTEM MENU > CALIBRATION > AUTOMATIC	9–1
Printing a Program Listing	[SETUP]	SYSTEM MENU > DOCUMENTATION > PRINT CYCLE SETUP	5–31
Setting Up the Print Log Interval		SYSTEM MENU > DOCUMENTATION > PRINTER	5–31
Setting Up the Printer Log Values Definition		SYSTEM MENU > DOCUMENTATION > PRINT LOG VALUES	5–32

TABLE 5–2. DISPLAY PANEL TASKS

TASK	SOFTKEY	MENU PATH	PAGE
Changing the Cycle Name and Number	[SETUP]	SYSTEM MENU > CONFIGURATION > EDIT CYCLES	5–36
Assigning the Sterilizer Name		SYSTEM MENU > CONFIGURATION > NAME	5–38
Selecting the Display Language		SYSTEM MENU > CONFIGURATION > LANGUAGE DATE UNIT	5–39
Selecting the Date Format	[SETUP	SYSTEM MENU > CONFIGURATION > LANGUAGE DATE UNIT	5–39
Selecting the Pressure and Temperature Units			5–40
Selecting the Default Process Screen		SYSTEM MENU > CONFIGURATION > PANEL SETUP	5–41
Selecting the Parameter Edit Mode			5–41
Setting the Screen Saver Delay Time			5–42
Setting Up the Confirm Save/ Cancel? Prompt			5–42
Editing the Extended Parameters			5–43
Adding a User	[SETUP]	SYSTEM MENU > PASSWORD	5–45
Configuring Password Access Privileges			5–46
Deleting a User			5–46
Configuring the Sterilizer (633HC)	[SETUP]	SYSTEM MENU > DIPSWITCHES	5–49
Configuring the Sterilizer (633LS)			5–51
Enabling the Auto Blow-Down Option			5–53
Enabling the Load Probe Option (633LS Only)			5–53
Enabling the Vacuum Pump Option (633LS Only)			5–53
Enabling the Water-Saver Option			5–54
Enabling the Utilities Shutdown Feature			5–54
Enabling the Parameter Check Feature			5–54
Enabling the Sterilizer for Use With T-Doc			5–55
Enabling Service Mode			5–55

TABLE 5–2. DISPLAY PANEL TASKS

TASK	SOFTKEY	MENU PATH	PAGE
Viewing the Error Log	[SETUP]	SYSTEM MENU > SERVICE > ERROR LOG	8–17
Viewing the Analog Inputs		SYSTEM MENU > SERVICE > DIAGNOSTIC > ANALOG INPUT	8–19
Viewing the Digital Inputs		SYSTEM MENU > SERVICE > DIAGNOSTIC > DIGITAL INPUT	8–20
Viewing and Operating the Digital Outputs		SYSTEM MENU > SERVICE > DIAGNOSTIC > DIGITAL OUTPUT	8–22
Viewing the System Flags		SYSTEM MENU > SERVICE > DIAGNOSTIC > USER FLAGS	8–26
Viewing the User Flags		SYSTEM MENU > SERVICE > DIAGNOSTIC > SYSTEM FLAGS	8–27
Testing the Printer		SYSTEM MENU > SERVICE > DIAGNOSTIC > PRINTER	8–28
Testing the LEDs and Buzzer		SYSTEM MENU > SERVICE > DIAGNOSTIC > LED/BUZZER	8–28
Saving the Program in RAM to the Flash EPROM	[SETUP]	SYSTEM MENU > SAVE RAM TO FLASH	5–58

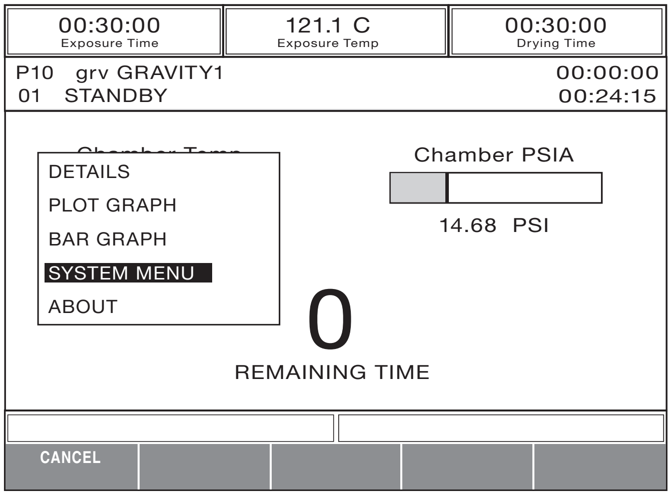
NAVIGATION BASICS

SELECTING AN ITEM

To select an item from a menu list:

1. Use the up and down arrows to select the item.
2. Press ENTER.

FIGURE 5–2. TYPICAL MENU LIST



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15
Chamber PSIA 14.68 PSI
0 REMAINING TIME

DETAILS
PLOT GRAPH
BAR GRAPH
SYSTEM MENU
ABOUT
CANCEL
WS-0039

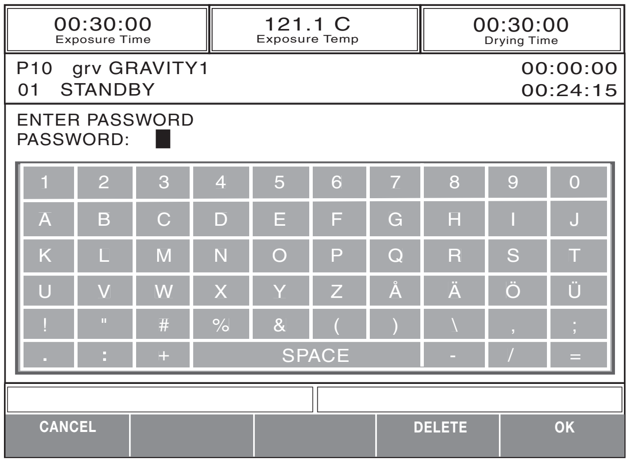
NOTE

If all the items in the list do not fit on one screen, a black bar will appear to the right of the list. Use the down arrow to view the additional items.

ENTERING A PASSWORD (OR ALPHANUMERIC VALUE)

When a password is required (or an alphanumeric value needs to be entered), a password entry screen appears.

FIGURE 5–3. ENTER PASSWORD SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

ENTER PASSWORD
PASSWORD:

WS-0017

To enter a password or change a parameter value:

1. Use the directional arrows to select the first character.
2. Press ENTER.

   The password character is indicated by a pound sign (#).
3. Repeat steps 1 and 2 for additional characters.

NOTE

If you make a mistake, press [DELETE] to erase the last character.

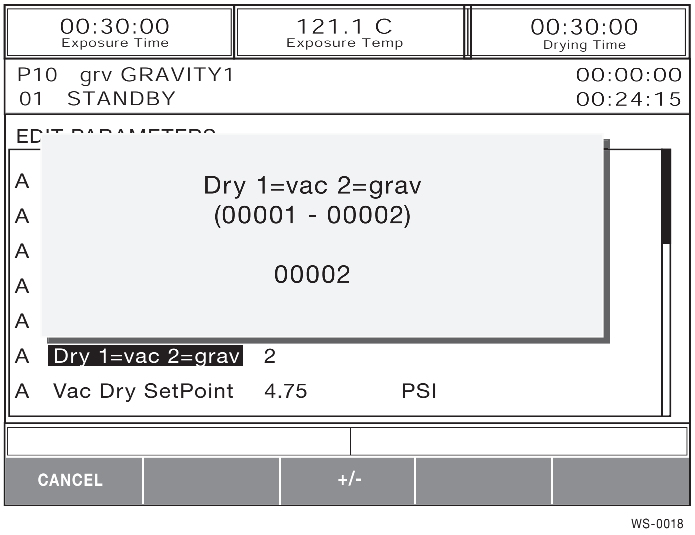
---

4. Press [OK] when all characters have been entered.

ENTERING A DATA VALUE

When a data value (e.g., cycle setting, calibration value, etc.) needs to be entered, a dialog box appears.

FIGURE 5–4. TYPICAL DATA ENTRY DIALOG BOX



```
00:30:00              121.1 C               00:30:00
Exposure Time         Exposure Temp         Drying Time
P10   grv GRAVITY1                                00:00:00
01   STANDBY                                      00:24:15
ED
A
A               Dry 1=vac 2=grav
A               (00001 - 00002)
A
A                    00002
A   Dry 1=vac 2=grav   2
A   Vac Dry SetPoint   4.75          PSI
```

To enter a data value:

1. Press ENTER.

   The last digit of the value will blink.

2. Use the up and down arrows to increase or decrease the digit.

   Use the left and right arrows to move from digit to digit.

3. Press ENTER.
4. Press [SAVE].

   The CONFIRM SAVE? YES OR NO prompt appears.

NOTE

If desired, the CONFIRM SAVE? prompt can be turned off by changing the CONFIRM SAVE/CANCEL setting on the PANEL SETUP screen. See "Setting Up the Confirm Save/Cancel? Prompt" on page 5–42.

---

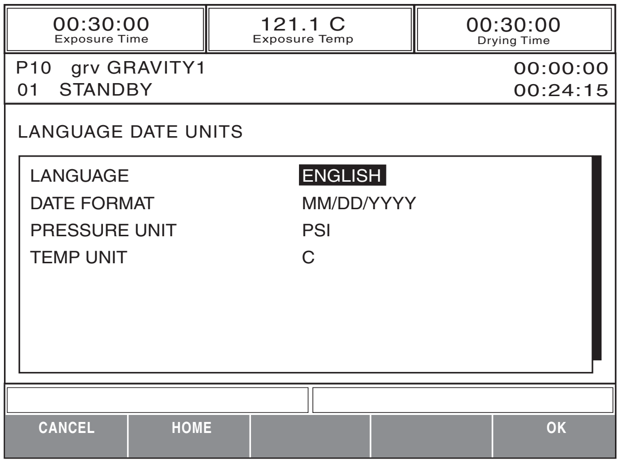
5. Press [YES].

6. Press [OK].

SELECTING A SETUP OPTION

Some fields have multiple choice setup options (e.g., temperature and pressure units setup).

FIGURE 5–5. TYPICAL SETUP OPTION FIELD



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

LANGUAGE DATE UNITS

LANGUAGE ENGLISH
DATE FORMAT MM/DD/YYYY
PRESSURE UNIT PSI
TEMP UNIT C

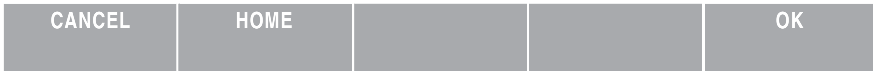
To select a setup option:

1. Use the directional arrows to select the field to be changed.
2. Press ENTER.
3. Use the up or down arrow to switch between choices.
4. Press ENTER.
5. Press [SAVE].

   The *CONFIRM SAVE? YES OR NO* prompt appears.
6. Press [YES].
7. Repeat steps 1 thru 6 for other setup options.
8. Press [OK] when finished.

EXITING A DISPLAY SCREEN

There are three commands that are used to exit a display screen: [CANCEL], [HOME], and [OK].



WS-0158

To exit from a display screen:

- Press [CANCEL] to return to the previous screen.
- Press [HOME] to return to the process screen.

If a screen has both [OK] and [CANCEL] buttons:

- Press [OK] to return to the previous screen. Use this button when you have completed the desired task.
- Press [CANCEL] to return to the previous screen. Use this button if you want to exit a screen (e.g., if you selected a screen by mistake).

SOFTKEYS

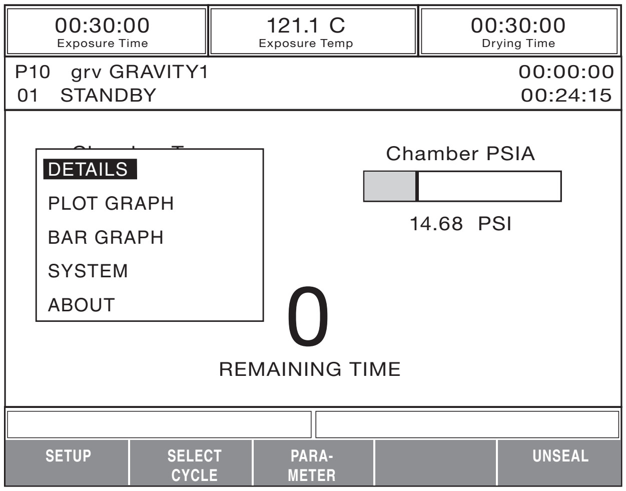
SETUP SOFTKEY

SETUP MENU ITEMS

When the [SETUP] softkey is pressed, the SETUP menu appears. The SETUP menu (Figure 5–6) has five items:

- DETAILS—*see page 5–12*.
- PLOT GRAPH—*see page 5–12*.
- BAR GRAPH—*see page 5–13*.
- SYSTEM MENU—*see page 5–14*.
- ABOUT—*see page 5–15*.

FIGURE 5–6. SETUP MENU



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15
Chamber PSIA 14.68 PSI
0 REMAINING TIME

WS-0039-633HC

NOTE
A password is required for access to the SYSTEM MENU selections. Individual passwords have specific access privileges (see Table 5–1 on page 5–2). For example, a user may be given access to the TIME SETTINGS and CONFIGURATION menus but not the SERVICE MENU.

The user has the option of selecting one of three process screens: the normal process screen (DETAILS), a screen with a graphical display (PLOT GRAPH) or a screen with an enlarged timer (BAR GRAPH). A password is not required to select the process screen.

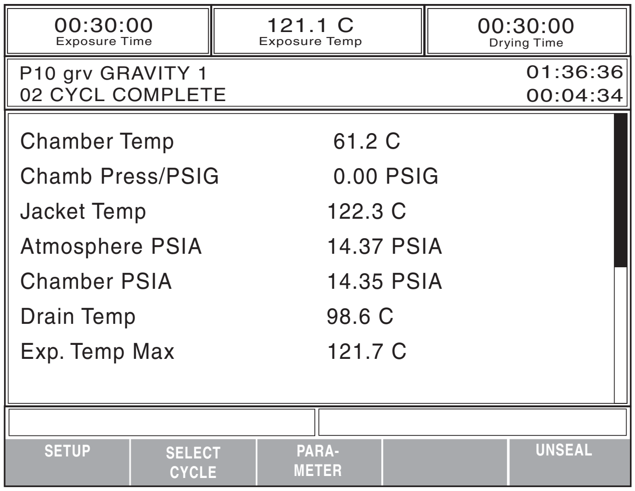
SELECTING THE DETAILS SCREEN

To select the Details process screen:

1. Press [SETUP].
2. Select DETAILS.
3. Press ENTER.

   The Details screen (Figure 5–7) appears.

FIGURE 5–7. DETAILS SCREEN



00:30:00	121.1 C	00:30:00
Exposure Time	Exposure Temp	Drying Time

P10 grv GRAVITY 1 01:36:36
02 CYCL COMPLETE 00:04:34

Chamber Temp	61.2 C
Chamb Press/PSIG	0.00 PSIG
Jacket Temp	122.3 C
Atmosphere PSIA	14.37 PSIA
Chamber PSIA	14.35 PSIA
Drain Temp	98.6 C
Exp. Temp Max	121.7 C

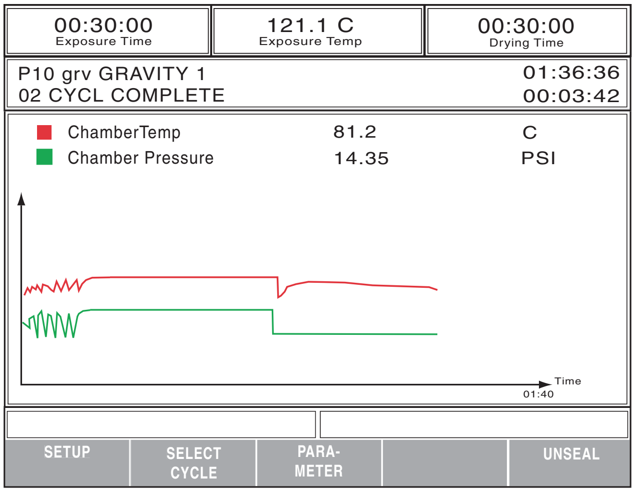
SELECTING THE PLOT GRAPH SCREEN

To select the Plot Graph process screen:

1. Press [SETUP].
2. Select PLOT GRAPH.
3. Press ENTER.

   The Plot Graph screen (Figure 5–8) appears.

FIGURE 5–8. PLOT GRAPH SCREEN



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY 1 01:36:36

02 CYCL COMPLETE 00:03:42

🟥 ChamberTemp 81.2 C

🟩 Chamber Pressure 14.35 PSI

Time
01:40
SETUP
SELECT CYCLE
PARA-METER
UNSEAL

WS-0013 633HC

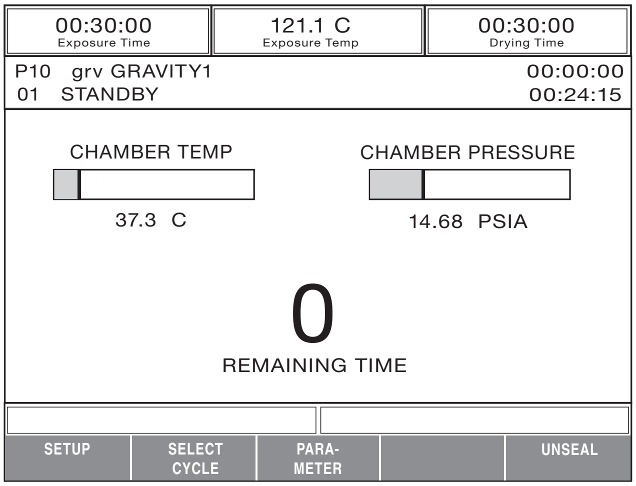
SELECTING THE BAR GRAPH SCREEN

To select the Bar Graph process screen:

1. Press [SETUP]
2. Select BAR GRAPH.
3. Press ENTER.

   The Bar Graph screen (Figure 5–9) appears.

FIGURE 5–9. BAR GRAPH SCREEN



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00

01 STANDBY 00:24:15

CHAMBER TEMP 37.3 C

CHAMBER PRESSURE 14.68 PSIA

0 REMAINING TIME

SETUP
SELECT CYCLE
PARA-METER
UNSEAL

WS-0014 633HC

ACCESSING THE SYSTEM MENU

The SYSTEM menu lists the service features of the control software. A password (with specific area access) is required to use these features.

To access the SYSTEM MENU:

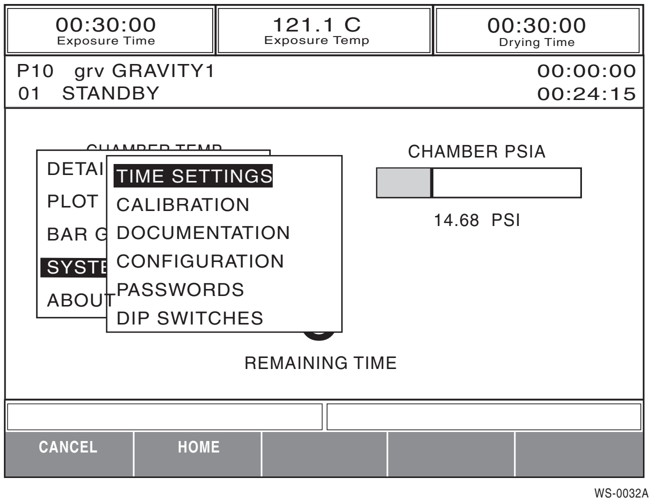
1. Press [SETUP]
2. Select SYSTEM MENU.
3. Press ENTER.

   The ENTER PASSWORD screen appears.

4. Enter your password (*see "Entering a Password (or Alphanumeric Value)" on page 5–7*).

   The SYSTEM MENU (Figure 5–10) appears.

FIGURE 5–10. SYSTEM MENU


00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
00:00:00
01 STANDBY
00:24:15
DETAI
PLOT
BAR G
SYSTE
ABOUT
TIME SETTINGS
CALIBRATION
DOCUMENTATION
CONFIGURATION
PASSWORDS
DIP SWITCHES
CHAMBER PSIA
14.68 PSI
REMAINING TIME
CANCEL
HOME
WS-0032A

5. *See "SYSTEM MENU" on page 5–21* for a description of the SYSTEM MENU and its submenus.

VIEWING THE ABOUT SCREEN

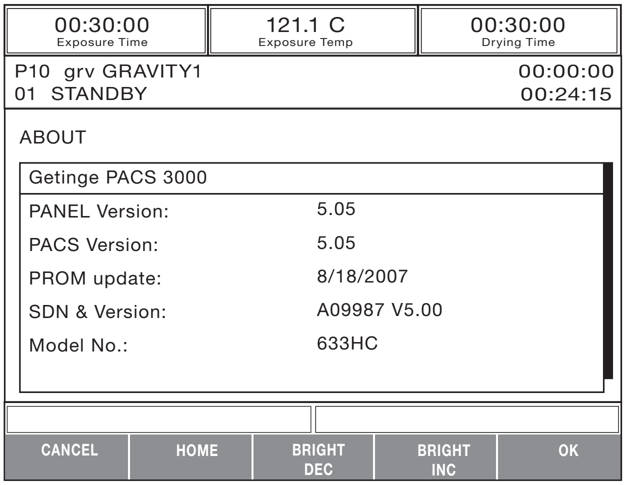
The ABOUT screen lists the software version and other pertinent information about the sterilizer.

To view the ABOUT screen:

1. Press [SETUP].
2. Select ABOUT.
3. Press ENTER.

   The ABOUT screen (Figure 5–11) appears.

FIGURE 5–11. ABOUT SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

ABOUT

Getinge PACS 3000
PANEL Version: 5.05
PACS Version: 5.05
PROM update: 8/18/2007
SDN & Version: A09987 V5.00
Model No.: 633HC

WS-0035 633HC

4. Press [OK] when finished.

ADJUSTING THE DISPLAY BRIGHTNESS

To adjust the brightness of the display:

1. Press [SETUP].
2. Select ABOUT.
3. Adjust the brightness:
   a. Press [BRIGHT INC] to increase the brightness.
   b. Press [BRIGHT DEC] to decrease the brightness.
4. Press [OK].

SELECT CYCLE SOFTKEY

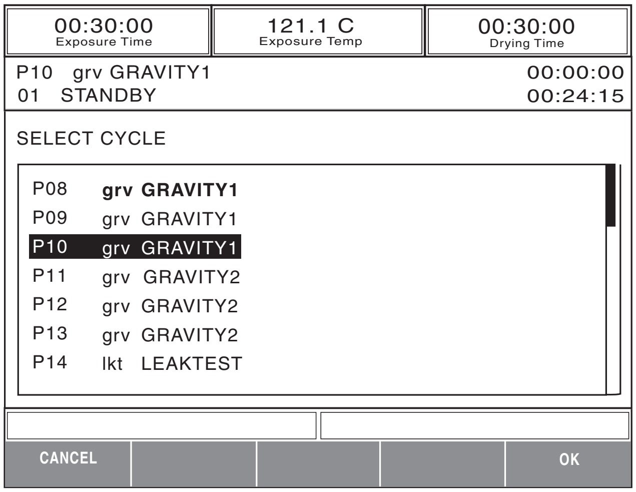
SELECTING A CYCLE

To select a cycle:

1. Press [SELECT CYCLE].

   The SELECT CYCLE screen (Figure 5–12) appears.

FIGURE 5–12. SELECT CYCLE SCREEN



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00

01 STANDBY 00:24:15

SELECT CYCLE

P08 **grv GRAVITY1**

P09 grv GRAVITY1

P10 grv GRAVITY1

P11 grv GRAVITY2

P12 grv GRAVITY2

P13 grv GRAVITY2

P14 lkt LEAKTEST

WS-0016 833HC

2. Use the up and down arrows to select the cycle.

3. Press ENTER.

   The process screen for the selected cycle appears.

PARAMETER SOFTKEY

The cycle parameters can be edited by users with Parameter Settings password access.

The parameters display is configured for either Quick Edit or Full Edit.

- Quick Edit allows the user to change the exposure time, exposure temperature, and drying time without using the EDIT PARAMETERS screen.
- Full Edit provides access to all adjustable parameters.

NOTE
To set up the display for Quick Edit or Full Edit, see "Selecting the Parameter Edit Mode" on page 5–41.

EDITING THE CYCLE PARAMETERS (QUICK EDIT)

To edit the cycle parameters:

1. Press [PARAMETER].

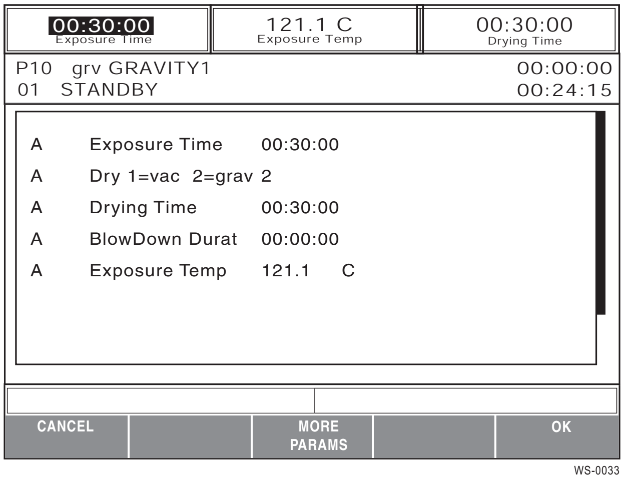
   The ENTER PASSWORD screen appears.

PARAMETER SETTINGS
ACCESS REQUIRED

2. Enter your password.

   The Exposure Time field of the process screen is highlighted (Figure 5–13).

FIGURE 5–13. QUICK EDIT SCREEN



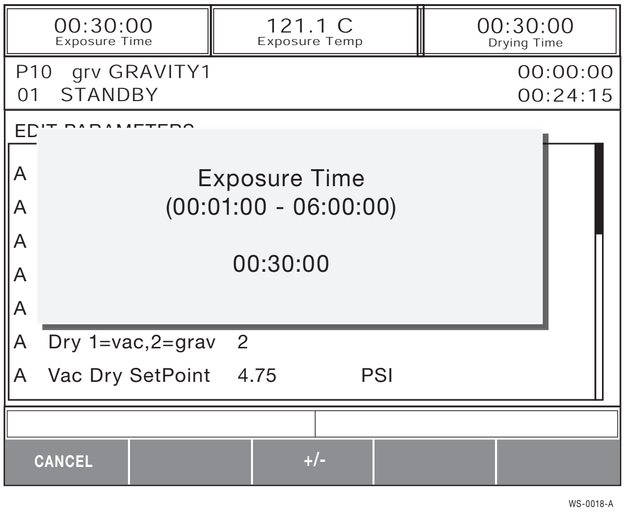
```
00:30:00            121.1 C             00:30:00
Exposure Time       Exposure Temp       Drying Time
P10  grv GRAVITY1                       00:00:00
01  STANDBY                             00:24:15

A     Exposure Time     00:30:00
A     Dry 1=vac  2=grav 2
A     Drying Time       00:30:00
A     BlowDown Durat    00:00:00
A     Exposure Temp     121.1    C
```

3. Using the LEFT or RIGHT arrow, select Exposure Time, Exposure Temp, or Drying Time.

4. Press ENTER.

   A dialog box (Figure 5–14) for the selected parameter appears. The last digit is blinking.

FIGURE 5–14. CYCLE PARAMETER DIALOG BOX



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00

01 STANDBY 00:24:15

Exposure Time
(00:01:00 - 06:00:00)

00:30:00

A	Dry 1=vac,2=grav	2	
A	Vac Dry SetPoint	4.75	PSI

5. Use the directional arrows to select the desired setting.

6. Press ENTER.

7. Press [SAVE].

8. Repeat steps 4 thru 6 for other parameters.

NOTE

To edit a parameter other than Exposure Time, Exposure Temp, or Drying Time, press MORE PARAMS and follow the procedure for Full Edit (see “see “Editing the Cycle Parameters (Full Edit)” on page 5–18”.

---

9. Press [OK] when finished.

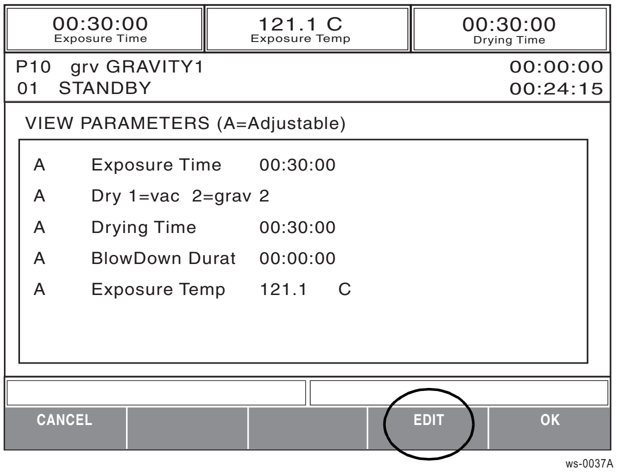
EDITING THE CYCLE PARAMETERS (FULL EDIT)

To edit the cycle parameters:

1. Press [PARAMETER].

   The VIEW PARAMETERS screen (Figure 5–15) appears.

FIGURE 5–15. VIEW PARAMETERS SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

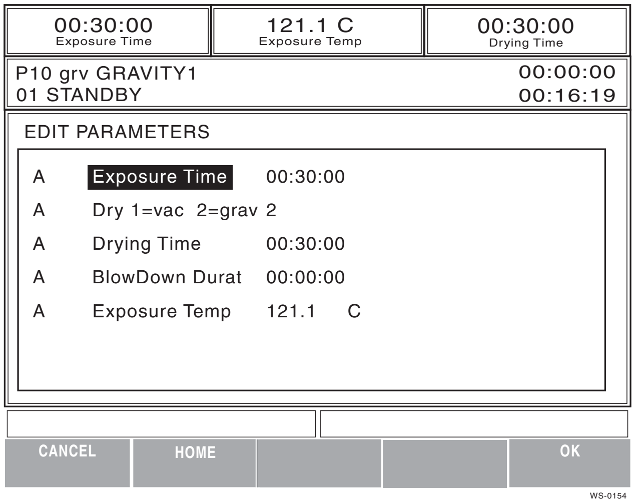
VIEW PARAMETERS (A=Adjustable)

A	Exposure Time	00:30:00
A	Dry 1=vac 2=grav	2
A	Drying Time	00:30:00
A	BlowDown Durat	00:00:00
A	Exposure Temp	121.1 C

2. Press [EDIT].

   The EDIT PARAMETERS screen (Figure 5–16) appears.

FIGURE 5–16. EDIT PARAMETERS SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:16:19

EDIT PARAMETERS

A	Exposure Time	00:30:00
A	Dry 1=vac 2=grav	2
A	Drying Time	00:30:00
A	BlowDown Durat	00:00:00
A	Exposure Temp	121.1 C

PARAMETER SETTINGS
ACCESS REQUIRED

3. Enter your password.

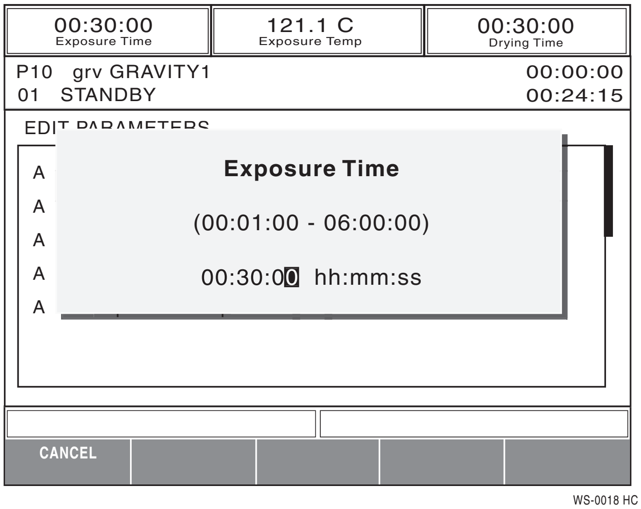
   The ENTER PASSWORD screen appears.

4. Select the desired parameter from the list.

5. Press ENTER.

   A dialog box (Figure 5–17) for the selected parameter appears.

FIGURE 5–17. EDIT PARAMETERS DIALOG BOX


00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
01 STANDBY
00:00:00
00:24:15
EDIT PARAMETERS
A
A
A
A
A
CANCEL
WS-0018 HC

Exposure Time

(00:01:00 - 06:00:00)

00:30:00 hh:mm:ss

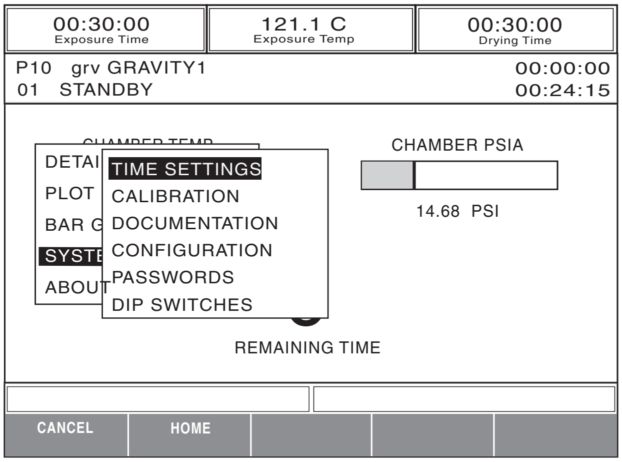
6. Use the directional arrows to select the desired setting.
7. Press ENTER.
8. Press [SAVE].
9. Repeat steps 4 thru 8 for other parameters.
10. Press [OK].

SYSTEM MENU

The SYSTEM MENU has eight options:

- TIME SETTINGS—*see page 5–22*.
- CALIBRATION—*see page 5–27*.
- DOCUMENTATION— *see page 5–30*.
- CONFIGURATION—*see page 5–35*.
- PASSWORDS—*see page 5–45*.
- DIP SWITCHES—*see page 5–48*.
- SERVICE—*see page 5–56*.
- SAVE RAM TO FLASH—*see page 5–58*.

FIGURE 5–18. SYSTEM MENU



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00

01 STANDBY 00:24:15

CHAMBER PSIA 14.68 PSI

CHAMBER TEMP
DETAI
PLOT
BAR G
SYSTE
ABOUT
TIME SETTINGS
CALIBRATION
DOCUMENTATION
CONFIGURATION
PASSWORDS
DIP SWITCHES
REMAINING TIME
CANCEL
HOME

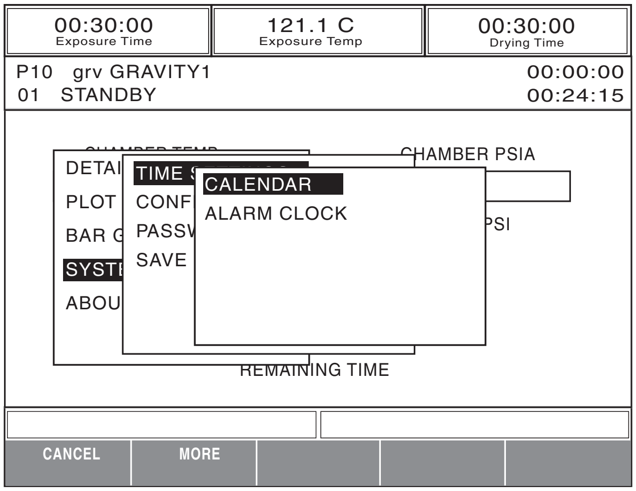
WS-0032A

TIME SETTINGS MENU

The TIME SETTINGS menu (Figure 5–19) has two options:

- CALENDAR— *see “Setting the Clock and Calendar” on page 5–22*.
- ALARM CLOCK— *see “Setting the Auto Blow-Down Time” on page 5–23* and *“Setting the Utilities Control Times” on page 5–25*.

FIGURE 5–19. TIME SETTINGS MENU


00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
01 STANDBY
00:00:00
00:24:15
CHAMBER TEMP
CHAMBER PSIA
DETAI
PLOT
BAR G
SYSTE
ABOU
TIME S
CONF
PASSW
SAVE
CALENDAR
ALARM CLOCK
PSI
REMAINING TIME
CANCEL
MORE
WS-0385

SETTING THE CLOCK AND CALENDAR

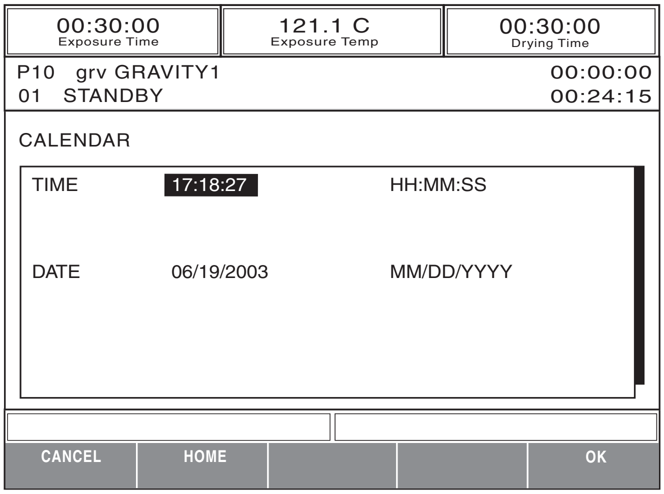
To set the clock and calendar:

TIME SETTINGS
ACCESS REQUIRED

1. Press [SETUP].
2. Select SYSTEM MENU > enter password > TIME SETTINGS > CALENDAR.
3. Press ENTER.

   The CALENDAR SCREEN (Figure 5–20) appears.

FIGURE 5–20. CALENDAR SCREEN


00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
01 STANDBY
00:00:00
00:24:15
CALENDAR
CANCEL
HOME
OK
ws-0021

TIME 17:18:27 HH:MM:SS

DATE 06/19/2003 MM/DD/YYYY

4. Select the TIME field.

NOTE
To change the time and date formats, “Selecting the Date Format” on page 5–39.

---

5. Press ENTER.

6. Use the directional arrows to set the correct time.

7. Press ENTER.

8. Select the DATE field.

9. Press ENTER.

10. Repeat steps 4 thru 6 for the date.

11. Press [SAVE] when finished.

    The *CONFIRM SAVE? YES OR NO* prompt appears.

12. Press [YES]

13. Press [OK].

SETTING THE AUTO BLOW-DOWN TIME

The alarm clock function is used to control the Auto Blow-Down option. Auto blow-down can be enabled on a day-to-day basis.

1. Press [SETUP].

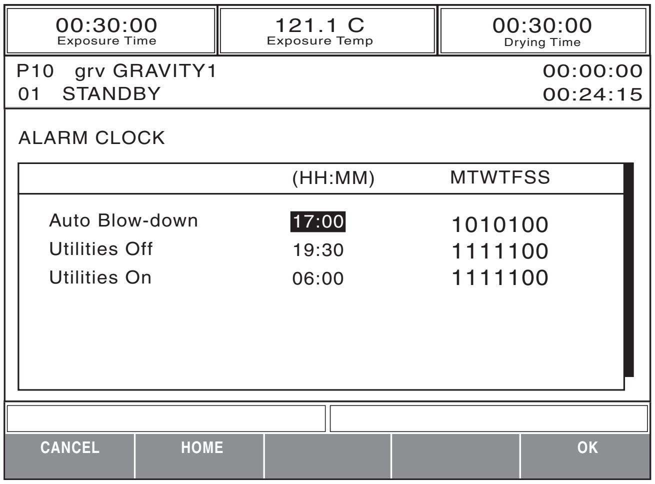
TIME SETTINGS
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > TIME SETTINGS > ALARM CLOCK.

3. Press ENTER.

   The ALARM CLOCK screen (Figure 5–21) appears.

FIGURE 5–21. ALARM CLOCK SCREEN



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00

01 STANDBY 00:24:15

ALARM CLOCK

	(HH:MM)	MTWTFSS
Auto Blow-down	17:00	1010100
Utilities Off	19:30	1111100
Utilities On	06:00	1111100

4. Use the directional arrows to select the Auto Blow-down time field.
5. Press ENTER.
6. Use the directional arrows to select the Auto Blow-down time.
7. Press ENTER.
8. Use the directional arrows to select the digit below M (Monday)
9. Use the up or down arrow to select 1 (ON) or 0 (OFF).
10. Repeat steps 7 and 8 for the other days of the week.
11. Press ENTER.
12. Press [SAVE].

    The *CONFIRM SAVE? YES OR NO* prompt appears.

13. Press [YES]
14. Press [OK].
15. Set the BlowDown Durat. parameter for each cycle (*see “Editing the Cycle Parameters (Full Edit)” on page 5–18*).

    If Auto Blow-Down is selected for a specific day, Auto Blow-down will occur at the time selected. The automatic drain valve will open for the duration selected by the BlowDown Durat. parameter for the cycle that is selected when the alarm occurs.

SETTING THE UTILITIES CONTROL TIMES

The alarm clock function is used to control the Utility Control feature. The Utility Control feature can be enabled on a day-to-day basis.

To set the alarm clock:

1. Press [SETUP].

TIME SETTINGS
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > TIME SETTINGS > ALARM CLOCK.

3. Press ENTER.

   The ALARM CLOCK screen (*see Figure 5–21 on page 5–24*.) appears.

4. Use the directional arrows to select the Utilities Off time field.

5. Press ENTER.

6. Use the directional arrows to select the Utilities Off time.

7. Press ENTER.

8. Use the directional arrows to select the digit below M (Monday).

9. Use the up or down arrow to select 1 (ON) or (OFF).

10. Repeat steps 7 and 8 for the other days of the week.

11. Press ENTER.

12. Use the directional arrows to select the Utilities On time field.

CAUTION

There can only be one Utilities ON and one Utilities OFF time each day, and the ON time must be earlier than the OFF time. Once Utilities OFF is activated, Utilities ON cannot be activated until the next day.

13. Press ENTER.

14. Repeat steps 5 thru 10 for the Utilities On time.

15. Press ENTER.

16. Press [SAVE].

    The *CONFIRM SAVE? YES OR NO* prompt appears.

17. Press [YES].

18. Press [OK].

BYPASSING UTILITY SHUTDOWN MODE

When Utility Shutdown is activated, the control panel displays *UTILITY SHUTDOWN.* The user can bypass this mode in order to run a single cycle.

To bypass utility shutdown for one cycle:

1. Press START.

   Utility shutdown mode is bypassed and the sterilizer begins to warm up.

2. Press START to begin the cycle.

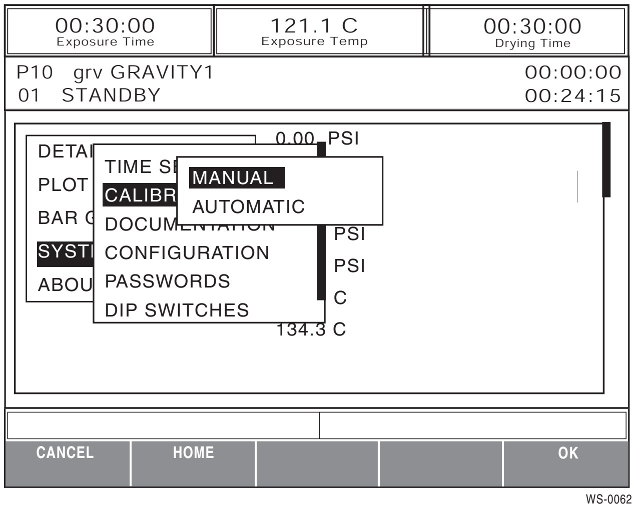
   The cycle runs to completion, and then the controls automatically revert to *UTILITY SHUTDOWN*.

CALIBRATION MENU

The CALIBRATION menu has two options:

- MANUAL—*see “Entering the Calibration Data Manually” on page 5–28*.
- AUTOMATIC—*see “Calibration” on page 9–1*.

FIGURE 5–22. CALIBRATION MENU



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

0.00 PSI
DETAI
PLOT
BAR C
SYSTI
ABOU
TIME SE
CALIBR
DOCUMENTATION
CONFIGURATION
PASSWORDS
DIP SWITCHES
MANUAL
AUTOMATIC
PSI
PSI
C
134.3 C
CANCEL
HOME
OK
WS-0062

ENTERING THE CALIBRATION DATA MANUALLY

When manual calibration is performed, the user directly enters the gain and offset values for the temperature sensors and pressure transducer. This method is used to reprogram the values after replacing the flash EPROM.

CAUTION

When the cold start button on the CPU Board is pressed, the calibration data is cleared from memory, Before replacing the EPROM, write down the gain and offset values for the temperature sensors and pressure transducer. The “633HC Configuration Worksheet” on page A–21 or “633LS Configuration Worksheet” on page A–23 may be used to record this information. If the calibration data is not recorded, it will be necessary to perform an automatic calibration which requires test equipment.

To enter the calibration data:

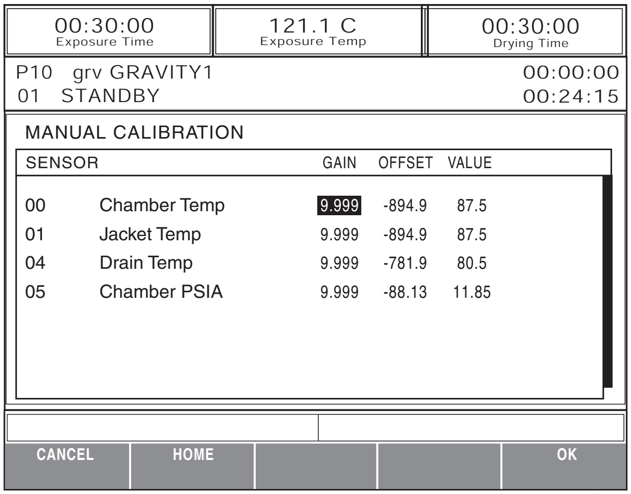
1. Press [SETUP].

CALIBRATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > CALIBRATION > MANUAL.
3. Press ENTER.

   The MANUAL CALIBRATION screen appears.

FIGURE 5–23. MANUAL CALIBRATION SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

MANUAL CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
00	Chamber Temp	9.999	-894.9	87.5
01	Jacket Temp	9.999	-894.9	87.5
04	Drain Temp	9.999	-781.9	80.5
05	Chamber PSIA	9.999	-88.13	11.85

WS-0066

4. Enter the gain and offset values for each sensor:
   a. Using the directional arrows, select the GAIN field for the sensor.
   b. Press ENTER.
   c. Use the directional arrows to select the gain value.
   d. Press ENTER.
   e. Select the OFFSET field.

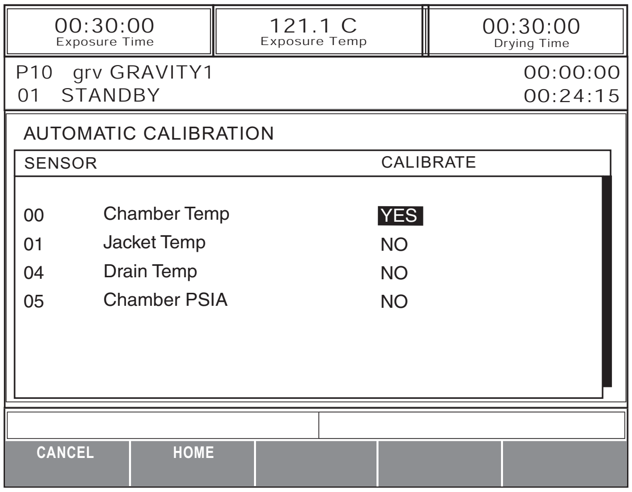
   f. Press ENTER.
   g. Use the directional arrows to select the offset value.
   h. Press ENTER.

5. Press [OK] when finished.

AUTOMATIC CALIBRATION

When automatic calibration is performed, the user enters low and high reference values for the sensor and the software calculates the gain and offset value. This method requires test equipment: a pressure meter for the pressure transducer, and test plugs with precise resistance (or ice and oil baths) for the temperature sensors. See *“Calibration” on page 9–1* for the procedures.

FIGURE 5–24. AUTOMATIC CALIBRATION SCREEN



P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

AUTOMATIC CALIBRATION

SENSOR		CALIBRATE
00	Chamber Temp	YES
01	Jacket Temp	NO
04	Drain Temp	NO
05	Chamber PSIA	NO

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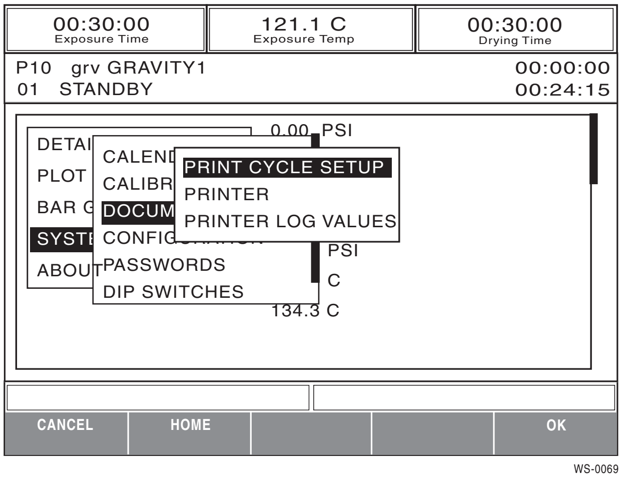
DOCUMENTATION MENU

The DOCUMENTATION menu (Figure 5–25) has three options:

- PRINT CYCLE SETUP—*see "Printing a Program Listing" on page 5–31*.
- PRINTER—*see "Setting Up the Print Log Interval" on page 5–31*.
- PRINTER LOG VALUES—*see "Setting Up the Printer Log Values Definition" on page 5–32*.

FIGURE 5–25. DOCUMENTATION MENU



00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
00:00:00
01 STANDBY
00:24:15
0.00 PSI
DETAI
PLOT
BAR G
SYSTE
ABOUT
CALEND
CALIBR
DOCUM
CONFIG
PASSWORDS
DIP SWITCHES
PRINT CYCLE SETUP
PRINTER
PRINTER LOG VALUES
PSI
C
134.3 C
CANCEL
HOME
OK
WS-0069

PRINTING A PROGRAM LISTING

To obtain a list of cycles phases:

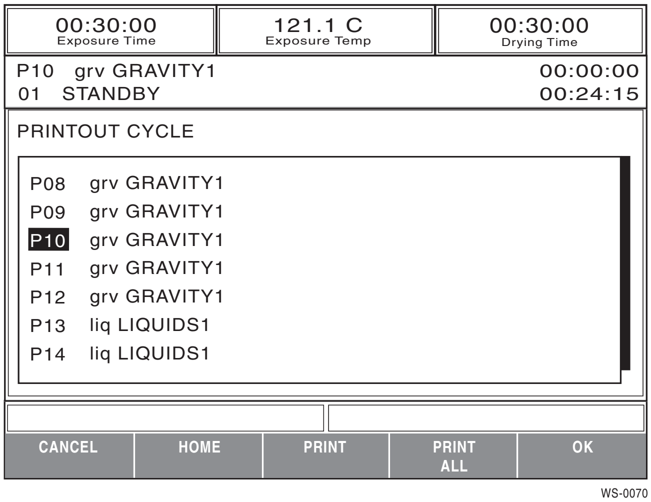
1. Press [SETUP].

DOCUMENTATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > DOCUMENTATION > PRINT CYCLE SETUP.
3. Press ENTER.

   The PRINTOUT CYCLE screen (Figure 5–26) appears.

FIGURE 5–26. PRINTOUT CYCLE SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

PRINTOUT CYCLE

P08 grv GRAVITY1
P09 grv GRAVITY1
P10 grv GRAVITY1
P11 grv GRAVITY1
P12 grv GRAVITY1
P13 liq LIQUIDS1
P14 liq LIQUIDS1

4. Select the desired cycle.
5. Press [PRINT] to print the program.
6. Repeat steps 3 thru 5 for other cycles.
7. Press [OK].

SETTING UP THE PRINT LOG INTERVAL

The printer records data at two rates: a normal rate (fast log interval) during the exposure phase and a slower rate (slow log interval) during the other cycle phases.

To set up the printer log interval:

1. Press [SETUP].

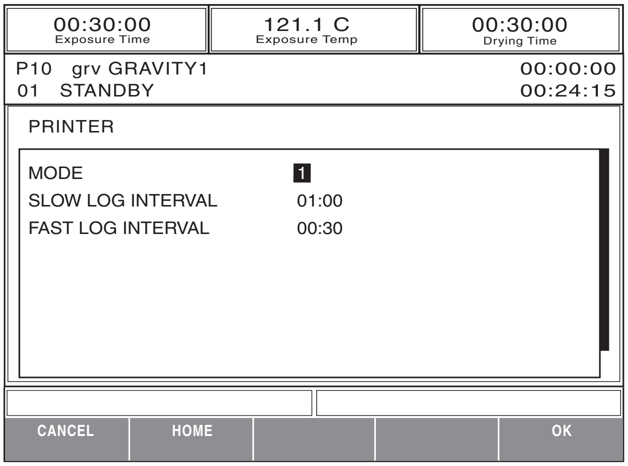
DOCUMENTATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > DOCUMENTATION > PRINTER.

3. Prees ENTER.

   The PRINTER screen (Figure 5–27) appears.

FIGURE 5–27. PRINTER SCREEN



00:30:00 | 121.1 C | 00:30:00

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

PRINTER

MODE 1
SLOW LOG INTERVAL 01:00
FAST LOG INTERVAL 00:30

CAUTION
Do NOT change the MODE value.

---

4. Select the SLOW LOG INTERVAL field.
5. Press ENTER.
6. Use the arrows to enter the desired value.
7. Press [SAVE].
8. Select the FAST LOG INTERVAL field.
9. Repeat steps 4 thru 6.
10. Press [OK].

SETTING UP THE PRINTER LOG VALUES DEFINITION
The printout can be set up to display up to four values. The values are identified by name and value type/item (e.g., AI01 CHAMBER TEMP is analog input (AI) number 1, chamber temperature).

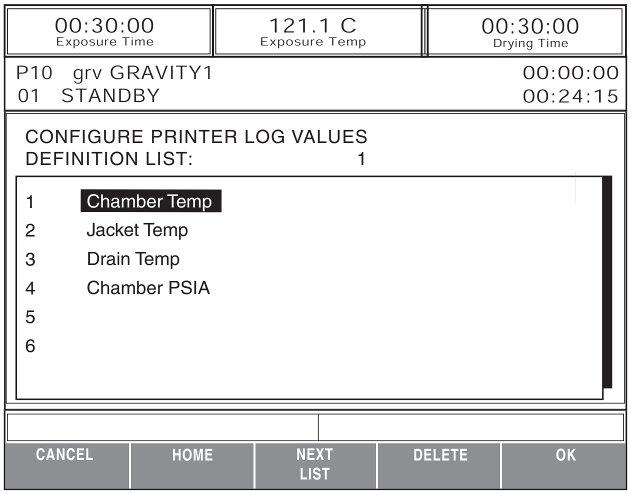
To set up the printer log values definitions:

DOCUMENTATION
ACCESS REQUIRED

1. Select SYSTEM MENU > enter password > DOCUMENTATION > PRINTER LOG VALUES.
2. Press ENTER.

   The CONFIGURE PRINTER LOG VALUES screen (Figure 5–28) appears.

FIGURE 5–28. CONFIGURE PRINTER LOG VALUES SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

CONFIGURE PRINTER LOG VALUES
DEFINITION LIST: 1

1 Chamber Temp
2 Jacket Temp
3 Drain Temp
4 Chamber PSIA
5
6

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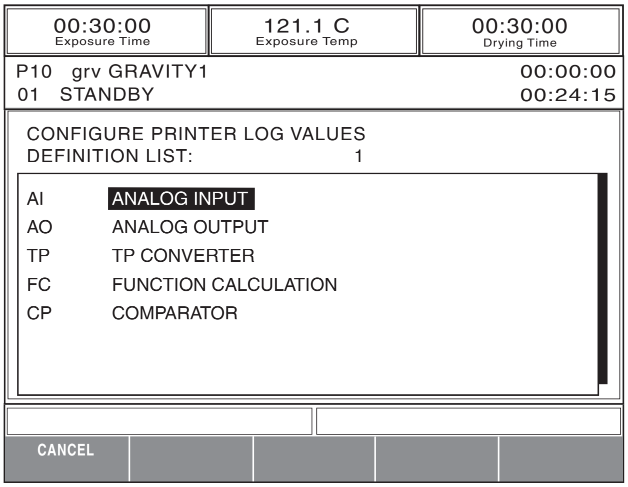
3. Select the printer column (e.g., 1, 2, 3,4) to be assigned.
4. Press ENTER.

   The log value type list (*see Figure 5–29 on page 5–33*) appears.

FIGURE 5–29. LOG VALUE TYPE SELECTION



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

CONFIGURE PRINTER LOG VALUES
DEFINITION LIST: 1

AI ANALOG INPUT
AO ANALOG OUTPUT
TP TP CONVERTER
FC FUNCTION CALCULATION
CP COMPARATOR

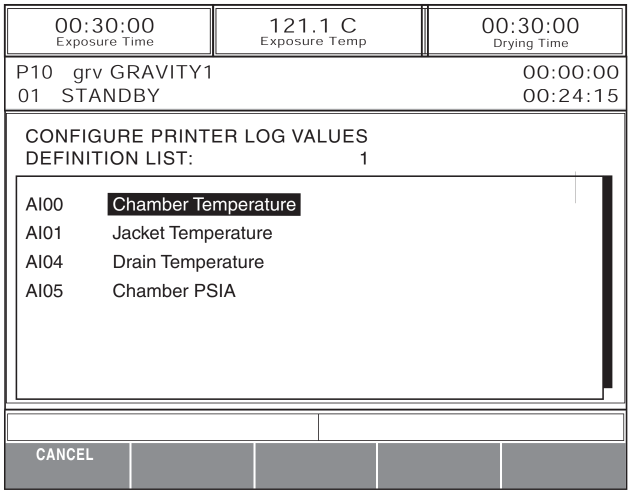
WS-0027

5. Select the value type (e.g., AI ANALOG INPUT).
6. Press ENTER.

   The log value item list (Figure 5–30) appears.

7. Select the input source from the list (e.g., Chamber RTD).

FIGURE 5–30. LOG VALUE ITEM SELECTION



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

CONFIGURE PRINTER LOG VALUES
DEFINITION LIST: 1

AI00 Chamber Temperature
AI01 Jacket Temperature
AI04 Drain Temperature
AI05 Chamber PSIA

8. Press [SAVE].

   The CONFIGURE PRINTER LOG VALUES screen (*see Figure 5–28 on page 5–33*) appears again.

9. Repeat steps 2 thru 8 for other column(s).

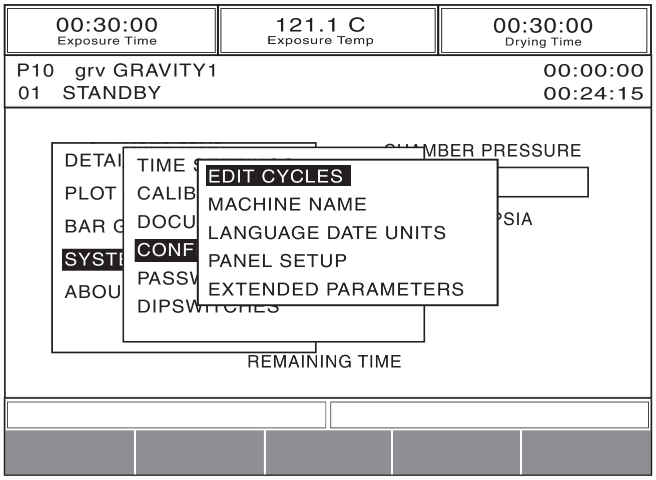
10. Press [OK] when finished.

CONFIGURATION MENU

The CONFIGURATION menu (Figure 5–31) has five options:

- EDIT CYCLES—*see "Changing the Cycle Name and Number" on page 5–36*.
- NAME—*see "Assigning the Sterilizer Name" on page 5–38*.
- LANGUAGE DATE UNITS—see:
  - *"Selecting the Display Language" on page 5–39*.
  - *"Selecting the Date Format" on page 5–39*.
  - *"Selecting the Pressure and Temperature Units" on page 5–40*.
- PANEL SETUP—see:
  - *"Selecting the Default Process Screen" on page 5–41*.
  - *"Selecting the Parameter Edit Mode" on page 5–41*.
  - *"Setting the Screen Saver Delay Time" on page 5–42*.
  - *"Setting Up the Confirm Save/Cancel? Prompt" on page 5–42*.
- EXTENDED PARAMETERS—*see "Editing the Extended Parameters" on page 5–43*.

FIGURE 5–31. CONFIGURATION MENU



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00

01 STANDBY 00:24:15

DETAI
PLOT
BAR G
SYSTE
ABOU
TIME
CALIB
DOCU
CONF
PASSV
DIPSWITCHES
EDIT CYCLES
MACHINE NAME
LANGUAGE DATE UNITS
PANEL SETUP
EXTENDED PARAMETERS
CHAMBER PRESSURE
PSIA
REMAINING TIME

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CHANGING THE CYCLE NAME AND NUMBER

To change the cycle number (P number) and name:

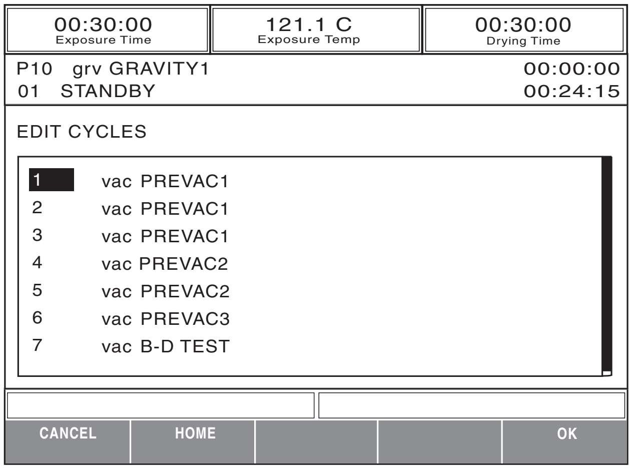
1. Press [SETUP].

CONFIGURATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > CONFIGURATION > EDIT CYCLES.
3. Press ENTER.

   The EDIT CYCLES screen (Figure 5–32) appears.

FIGURE 5–32. EDIT CYCLES SCREEN



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

EDIT CYCLES

1 vac PREVAC1
2 vac PREVAC1
3 vac PREVAC1
4 vac PREVAC2
5 vac PREVAC2
6 vac PREVAC3
7 vac B-D TEST

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4. Select the cycle number to be changed.
5. Press ENTER.
6. Use the arrows to enter the desired value. Press [SAVE].

NOTE
If two or more numbers are equal when SAVE is pressed, TWO OR MORE SEQ. NUMBERS EQUAL will be displayed. Before pressing OK, be sure to change one of the duplicate numbers.

---

7. Select the cycle name to be changed.
8. Press ENTER.

   The ENTER NAME screen appears.

9. Enter the new name.

☞ **NOTE**

Cycle names can be up to eight characters long. The three letter prefix (e.g., grv) indicates the cycle type and cannot be changed.

10. Use the arrows and [ENTER] button to enter the cycle name.

11. Press [SAVE].

12. Repeat steps 3 thru 11 for other cycles.

13. Press [OK] when finished.

ASSIGNING THE STERILIZER NAME

To assign the sterilizer name:

1. Press [SETUP].

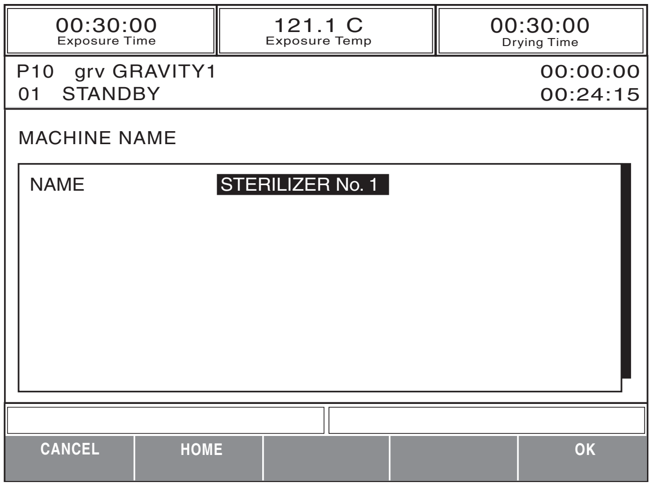
CONFIGURATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > CONFIGURATION > NAME.

3. Press ENTER.

   The MACHINE NAME screen (Figure 5–33) appears.

FIGURE 5–33. MACHINE NAME SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15
MACHINE NAME
NAME STERILIZER No. 1

CANCEL
HOME
OK

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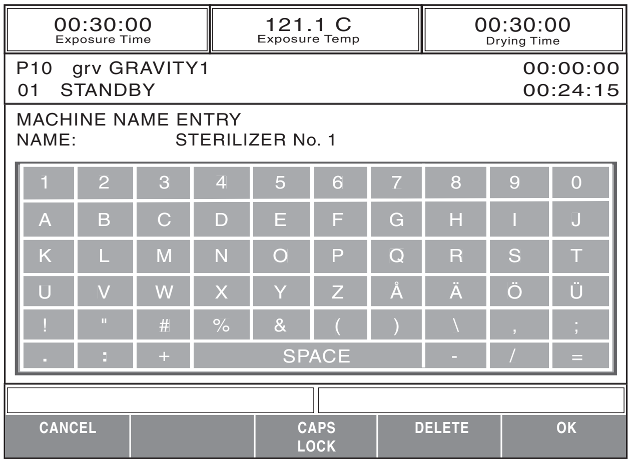
4. Select the NAME field.

   The MACHINE NAME ENTRY screen (Figure 5–34) appears.

FIGURE 5–34. MACHINE NAME ENTRY SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15
MACHINE NAME ENTRY
NAME: STERILIZER No. 1

1 2 3 4 5 6 7 8 9 0
A B C D E F G H I J
K L M N O P Q R S T
U V W X Y Z Å Ä Ö Ü
! " # % & ( ) \ , ;
. : + SPACE - / =
CANCEL
CAPS LOCK
DELETE
OK

WS-0020

5. Use the arrows and ENTER button to enter the sterilizer name.

6. Press [SAVE].

7. Press [OK].

SELECTING THE DISPLAY LANGUAGE

To select the language, date format, and pressure and temperature units:

1. Press [SETUP].

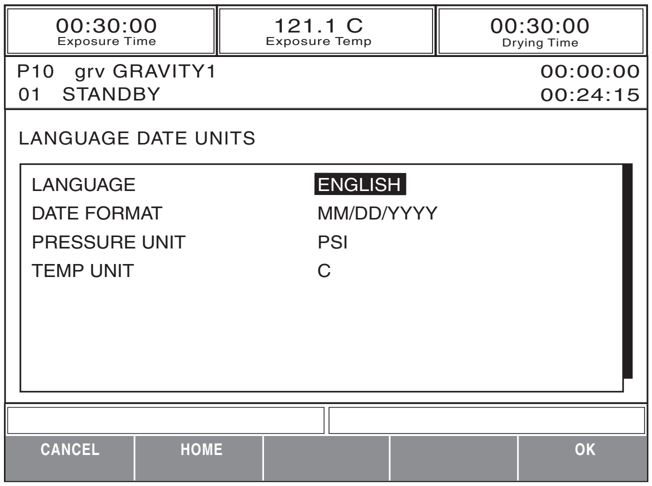
CONFIGURATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > CONFIGURATION > LANGUAGE DATE UNITS.

3. Press ENTER.

   The LANGUAGE DATE UNITS screen (Figure 5–35) appears.

FIGURE 5–35. LANGUAGE DATE UNITS SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

LANGUAGE DATE UNITS

LANGUAGE ENGLISH
DATE FORMAT MM/DD/YYYY
PRESSURE UNIT PSI
TEMP UNIT C

4. Select the LANGUAGE field.

5. Press ENTER.

6. Use the UP or DOWN arrow to select the language: English, French, or Spanish.

7. Press [SAVE].

SELECTING THE DATE FORMAT

To select the date format:

1. Select the LANGUAGE DATE UNITS screen.

2. Select the DATE FORMAT field.

3. Press ENTER.

4. Use the UP or DOWN arrow to select from the available date formats: MM/DD/YYYY, DD/MM/YYYY, or YYYY/MM/DD.
5. Press [SAVE].

SELECTING THE PRESSURE AND TEMPERATURE UNITS

To select the pressure and temperature units:

1. Select the LANGUAGE DATE UNITS screen (*Figure 5–35 on page 5–39*).
2. Select the PRESSURE UNIT field.
3. Press ENTER.
4. Use the UP or DOWN arrow to select PSI, KPA, or BARS.
5. Press [SAVE].
6. Select the TEMP UNIT field.
7. Press ENTER.
8. Use the UP or DOWN arrow to select F or C.
9. Press [SAVE].
10. Press [OK].

SELECTING THE DEFAULT PROCESS SCREEN

To select the default process screen:

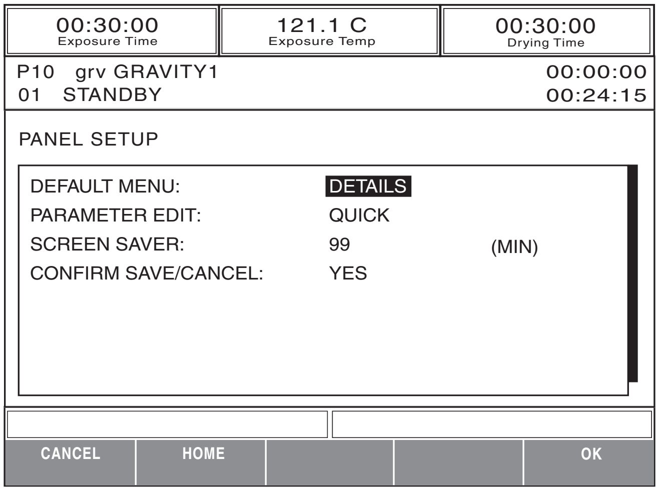
1. Press [SETUP].

CONFIGURATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > CONFIGURATION > PANEL SETUP.
3. Press ENTER.

   The PANEL SETUP screen (Figure 5–36) appears.

FIGURE 5–36. PANEL SETUP SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

PANEL SETUP

DEFAULT MENU: DETAILS
PARAMETER EDIT: QUICK
SCREEN SAVER: 99 (MIN)
CONFIRM SAVE/CANCEL: YES

4. Select the DEFAULT MENU field.
5. Press ENTER.
6. Use the UP or DOWN arrow to select DETAILS, PLOT GRAPH, or BAR GRAPH.
7. Press [SAVE].

SELECTING THE PARAMETER EDIT MODE

To select the parameter edit mode:

1. Select the PANEL SETUP screen.
2. Select the PARAMETER EDIT field.
3. Press ENTER.
4. Use the UP or DOWN arrow to select QUICK or FULL edit.
5. Press [SAVE].

SETTING THE SCREEN SAVER DELAY TIME

To set the screen saver delay time:

1. Select the PANEL SETUP screen (*Figure 5–36 on page 5–41*).
2. Select the SCREEN SAVER field.
3. Press ENTER.
4. Use the arrows to select the screen saver delay value (in minutes).
5. Press [SAVE].

SETTING UP THE CONFIRM SAVE/CANCEL? PROMPT

To set up the Confirm Save/Cancel? prompt:

1. Select the PANEL SETUP screen (*Figure 5–36 on page 5–41*).
2. Select the CONFIRM SAVE/CANCEL field.
3. Press ENTER.
4. Use the UP or DOWN arrow to select YES or NO.
5. Press [SAVE].
6. Press [OK] when finished.

EDITING THE EXTENDED PARAMETERS

To edit the extended parameters:

1. Press [SETUP].

CONFIGURATION

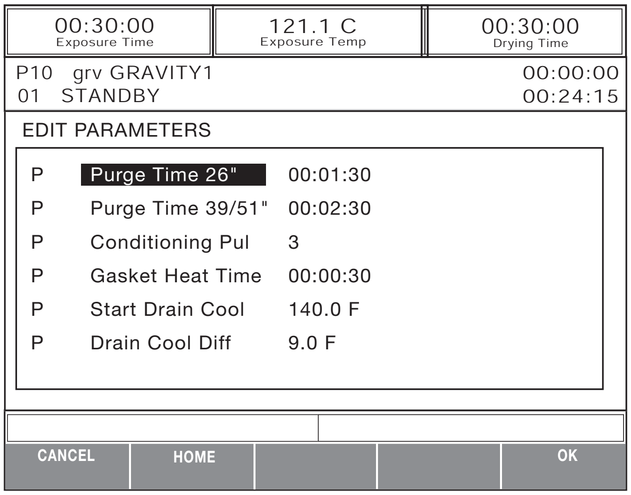
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > CONFIGURATION > EXTENDED PARAMETERS.

3. Press ENTER.

   The EDIT PARAMETERS screen (Figure 5–37) appears.

FIGURE 5–37. EDIT PARAMETERS SCREEN (EXTENDED)



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

EDIT PARAMETERS

P Purge Time 26" 00:01:30
P Purge Time 39/51" 00:02:30
P Conditioning Pul 3
P Gasket Heat Time 00:00:30
P Start Drain Cool 140.0 F
P Drain Cool Diff 9.0 F

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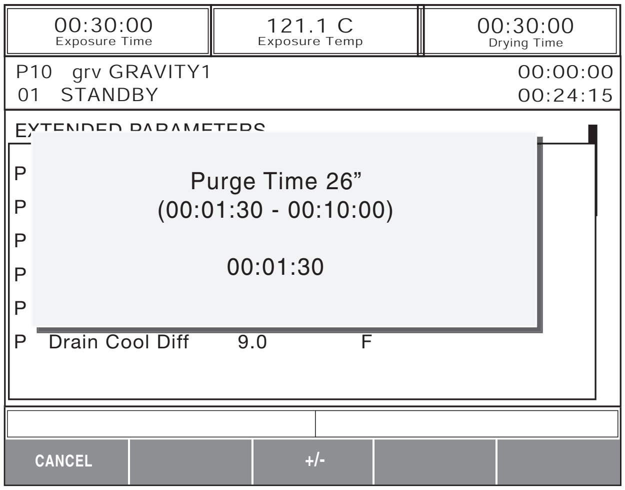
4. Select the desired parameter from the list.

5. Press ENTER.

   A dialog box for the selected parameters appears.

FIGURE 5–38. EXTENDED PARAMETERS DIALOG BOX



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

EXTENDED PARAMETERS

Purge Time 26”
(00:01:30 - 00:10:00)

00:01:30

P Drain Cool Diff 9.0 F

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6. Use the directional arrows to select the desired setting.
7. Press ENTER.
8. Press [SAVE].
9. Repeat steps 4 thru 8 for other parameters.
10. Press [OK].

PASSWORDS SCREEN

The PASSWORDS screen is used to assign passwords and enable levels of access. See *Table 5–1 on page 5–2* for a list of access areas and privileges.

ADDING A USER

To add a user to the passwords list:

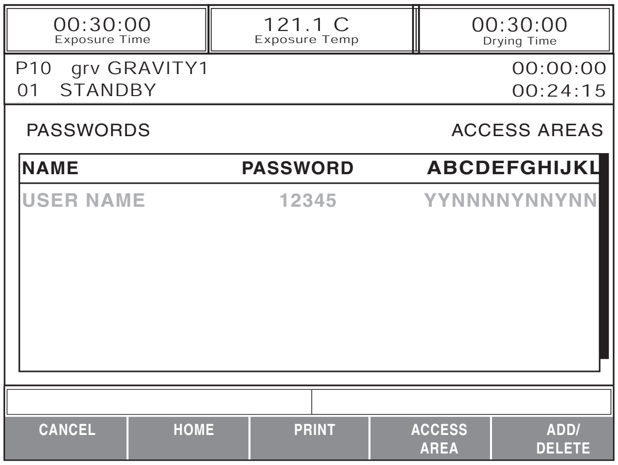
1. Press [SETUP].

PASSWORD SETUP
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > PASSWORDS.
3. Press ENTER.

   The PASSWORDS (Figure 5–39) screen appears.

FIGURE 5–39. PASSWORDS SCREEN



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

PASSWORDS ACCESS AREAS

NAME	PASSWORD	ABCDEFGHIJKL
USER NAME	12345	YYNNNNYNNYNN

4. Press [ADD/DELETE].
5. Press [ADD USER]
6. Assign the user name (*see “Entering a Password (or Alphanumeric Value)” on page 5–7*).
7. Press ENTER.
8. Select the PASSWORD field.
9. Press ENTER.
10. Assign the password (*see “Entering a Password (or Alphanumeric Value)” on page 5–7*).
11. Configure the password access privileges for the user.

CONFIGURING PASSWORD ACCESS PRIVILEGES

To configure the password access privileges for a user:

1. Press [SETUP].
2. Select SYSTEM MENU > enter password > PASSWORDS.
3. Press ENTER.

   The PASSWORDS screen (*Figure 5–39 on page 5–45*) appears.
4. Select the user name from the list.

NOTE

Press ACCESS AREAS to view the access area letter assignments.

---

5. Select the desired access area options one at a time.
   a. Select the first ACCESS AREA field that you want to enable or disable.
   b. Press ENTER.
   c. Use the UP or DOWN arrow to enable or disable access to that area.
   d. Press [SAVE].
   e. Repeat steps a. thru d. for other access areas.
6. Press [HOME] when finished (or [CANCEL] to return to the SYSTEM MENU).

DELETING A USER

To delete a user from the password list:

1. Press [SETUP].
2. Select SYSTEM MENU > enter password > PASSWORDS.
3. Press ENTER.

   The PASSWORDS screen (*Figure 5–39 on page 5–45*) appears.
4. Press [ADD/DELETE].
5. Press [DELETE USER]
6. Select the user name from the list.
7. Press ENTER.
8. Press [SAVE]

9. Press [HOME] when finished (or [CANCEL] to return to the SYSTEM MENU).

DIPSWITCHES SCREEN

The DIPSWITCHES screen is used for:

- setting up the physical configuration of the sterilizer:
  - single door or double door
  - door interlock option
  - chamber length

NOTE
The 633HC and 633LS sterilizers have different hardware configuration options. Refer to "Configuring the Sterilizer (633HC)" on page 5–49 or "Configuring the Sterilizer (633LS)" on page 5–51 for correct procedure.

- enabling the controls for hardware options:
  - automatic boiler blow-down
  - load probe (633LS only)
  - vacuum pump (633LS only)
  - water-saver
- enabling optional software features:
  - utilities shutdown
  - parameter check
  - communication with a T-Doc system
- disabling the door obstruction sensor circuit to allow removal of the door cover (DS20 Service Mode).

CONFIGURING THE STERILIZER (633HC)

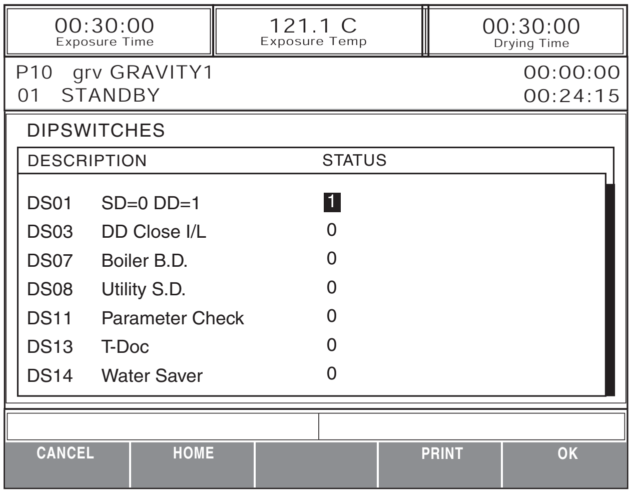
To configure the sterilizer (number of doors, interlock option, and chamber length):

HARDWARE SETUP
ACCESS REQUIRED

1. Press [SETUP].
2. Select SYSTEM MENU > enter password > DIPSWITCHES.
3. Press ENTER.

   The DIPSWITCHES screen (Figure 5–40) appears.

FIGURE 5–40. DIPSWITCHES SCREEN (633HC)



```
00:30:00        121.1 C         00:30:00
Exposure Time   Exposure Temp   Drying Time
P10  grv GRAVITY1                00:00:00
01   STANDBY                     00:24:15
DIPSWITCHES
DESCRIPTION                STATUS
DS01   SD=0 DD=1           1
DS03   DD Close I/L        0
DS07   Boiler B.D.         0
DS08   Utility S.D.        0
DS11   Parameter Check     0
DS13   T-Doc               0
DS14   Water Saver         0
```

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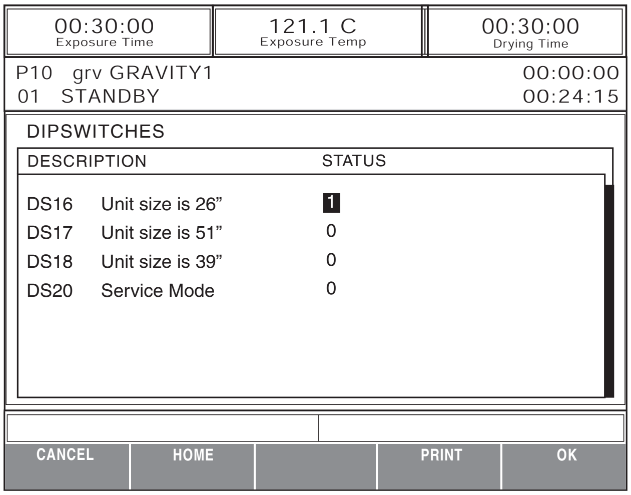

```
00:30:00        121.1 C         00:30:00
Exposure Time   Exposure Temp   Drying Time
P10  grv GRAVITY1                00:00:00
01   STANDBY                     00:24:15
DIPSWITCHES
DESCRIPTION                STATUS
DS16   Unit size is 26”    1
DS17   Unit size is 51”    0
DS18   Unit size is 39”    0
DS20   Service Mode        0
```

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4. Using the directional arrows, set DS01 and DS03 as required for door configuration:

Number and Type of Doors	DS01	DS03
Single Door	0	0
Double Door (Standard)	1	0
Double Door (Door Close Interlock)	1	1
INVALID CONFIGURATION	0	1

5. Using the directional arrows, scroll to the bottom of the screen (see Figure 5–40).

6. Set DS16, DS17, or DS18 as required for chamber length:

Chamber Length	DS16	DS17	DS18
26 in.	1	0	0
39 in.	0	0	1
51 in.	0	1	0
INVALID CONFIGURATION	1	1	0
	1	0	1
	0	1	1
	1	1	1

7. Press [OK].

CONFIGURING THE STERILIZER (633LS)

WARNING
POSSIBILITY OF CROSS-CONTAMINATION: Disabling the unidirectional door software function will compromise the integrity of the biological barrier between the load and unload ends of the sterilizer. Getinge does not recommend changing the door configuration from unidirectional doors (DS02) to door seal interlock (DS03).

CAUTION
The door seal interlock and unidirectional interlock are implemented by modifying both the door gasket piping and the control software. Do not change the door configuration from door closed interlock (DS04) to door seal interlock (DS03) or unidirectional doors (DS02). The sterilizer will not function without separate door gasket piping for the remote end.

NOTE
The door configuration may be changed from door seal interlock (DS03) to unidirectional doors (DS02). This will enhance the biological barrier between the load end and unload end but is not a substitute for a physical barrier.

To configure the sterilizer (number of doors, interlock type, and chamber length):

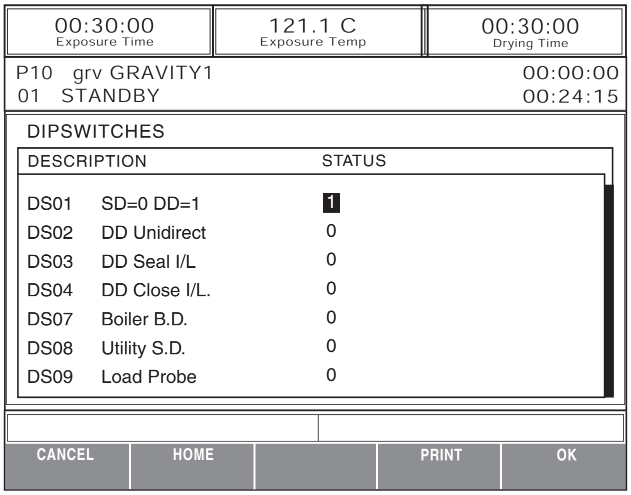
1. Press [SETUP].
2. Select SYSTEM MENU > enter password > DIPSWITCHES.

HARDWARE SETUP
ACCESS REQUIRED

3. Press ENTER.

   The DIPSWITCHES screen (Figure 5–40) appears.

FIGURE 5–41. DIPSWITCHES SCREEN



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

DIPSWITCHES

DESCRIPTION		STATUS
DS01	SD=0 DD=1	1
DS02	DD Unidirect	0
DS03	DD Seal I/L	0
DS04	DD Close I/L.	0
DS07	Boiler B.D.	0
DS08	Utility S.D.	0
DS09	Load Probe	0

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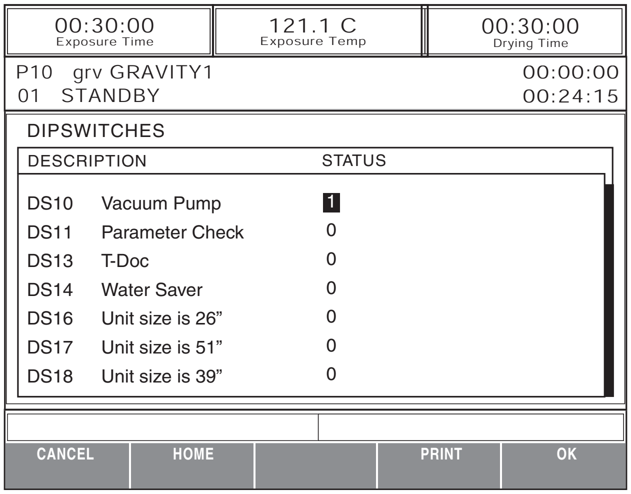

00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

DIPSWITCHES

DESCRIPTION		STATUS
DS10	Vacuum Pump	1
DS11	Parameter Check	0
DS13	T-Doc	0
DS14	Water Saver	0
DS16	Unit size is 26”	0
DS17	Unit size is 51”	0
DS18	Unit size is 39”	0

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4. Using the directional arrows, set DS01 thru DS04 as required for door configuration:

Number and Type of Doors	DS01	DS02	DS03	DS04
Single Door	0	0	0	0
Double Door (Standard)	1	0	0	0
Double Door (Door Close Interlock)	1	1	0	0
Double Door (Door Seal Interlock)	1	0	1	0
Double Door (Unidirectional))	1	0	0	1
INVALID CONFIGURATION	0	1	0	0
	0	0	1	0
	0	0	0	1
	0	1	1	0
	0	1	0	1
	0	0	1	1
	0	1	1	1
INVALID CONFIGURATION	1	1	1	0
	1	1	0	1
	1	0	1	1
	1	1	1	1

5. Using the directional arrows, scroll to the bottom of the screen (see Figure 5–40).

6. Set DS16 thru DS18 as required for chamber length:

Chamber Length	DS16	DS17	DS18
26 in.	1	0	0
39 in.	0	0	1
51 in.	0	1	0
INVALID CONFIGURATION	1	1	0
	1	0	1
	0	1	1
	1	1	1

7. Press [OK].

ENABLING THE AUTO BLOW-DOWN OPTION

To enable the auto blow-down package:

1. Verify the auto blow-down package is installed and connected as shown on *Figure 6–9, Sheet 1 on page 6–22*.
2. Select the DIPSWITCHES screen (see *Figure 5–40 on page 5–49*).
3. Using the directional arrows, set DS07 to 1.
4. Press [OK].

NOTE

To set the Auto Blow-down alarm time, see “Setting the Auto Blow-Down Time” on page 5–23

To set the Blowdown Durat. parameter, see “Editing the Cycle Parameters (Full Edit)” on page 5–18

ENABLING THE LOAD PROBE OPTION (633LS ONLY)

To enable the load probe option:

1. Verify the load probe is connected as shown on *Figure 6–9, Sheet 1 on page 6–22*.
2. Select the DIPSWITCHES screen (see *Figure 5–41 on page 5–51*).
3. Using the directional arrows, set DS09 to 1.
4. Press [OK].

ENABLING THE VACUUM PUMP OPTION (633LS ONLY)

To enable the vacuum pump option:

1. Verify the vacuum pump package is installed and connected.
2. Select the DIPSWITCHES screen (see *Figure 5–41 on page 5–51*).
3. Using the directional arrows, set DS10 to 1.
4. Press [OK].

ENABLING THE WATER-SAVER OPTION

NOTE
The MP-129F Water-Saver cannot be installed on a 633LS with a vacuum pump. If the Vacuum Pump (DS10 = 1) and Water Saver (DS14 = 1) options are both selected, an INVALID CONFIG message is displayed.

The MP-129F Water-Saver does not have a hardware bypass switch. Before servicing the water-saver, set DS14 to 0 to allow the sterilizer to be used without the water-saver.

To enable the sterilizer for use with the water-saver:

1. Verify the water-saver is installed and connected as shown on *Figure 6–16 on page 6–35*.
2. Select the DIPSWITCHES screen (see *Figure 5–40 on page 5–49*).
3. Using the directional arrows, set DS14 to 1
4. Press [OK].

ENABLING THE UTILITIES SHUTDOWN FEATURE

To enable the utilities shutdown feature:

1. Select the DIPSWITCHES screen (see *Figure 5–40 on page 5–49*).
2. Using the directional arrows, set DS08 to 1.

NOTE
To set the Utilities Off and Utilities On times and days of the week, see "Setting the Utilities Control Times" on page 5–25.

---

3. Press [OK].

ENABLING THE PARAMETER CHECK FEATURE

To enable the parameter check feature:

1. Select the DIPSWITCHES screen (see *Figure 5–40 on page 5–49*).
2. Using the directional arrows, set DS11 to 1.
3. Press [OK].

ENABLING THE STERILIZER FOR USE WITH T-DOC

NOTE
The installation and configuration of a T-Doc system is beyond the scope of this manual.Perform the following procedure after the sterilizer has been connected to the network.

To enable the sterilizer for use with a T-Doc system:

1. Verify communication cable from T-Doc system is connected to the RS-232 connector on back of control box).

2. Select the DIPSWITCHES screen (see *Figure 5–40 on page 5–49*).

3. Set DS13 to 1.

4. Press [OK].

ENABLING SERVICE MODE

The service mode feature is implemented by a hardware jumper and software modification. When the sterilizer controls are in service mode, the doors may operated but cycles cannot be run.

1. See *“Bypassing the Door Obstruction Sensors (Service Mode)” on page 4–5*.

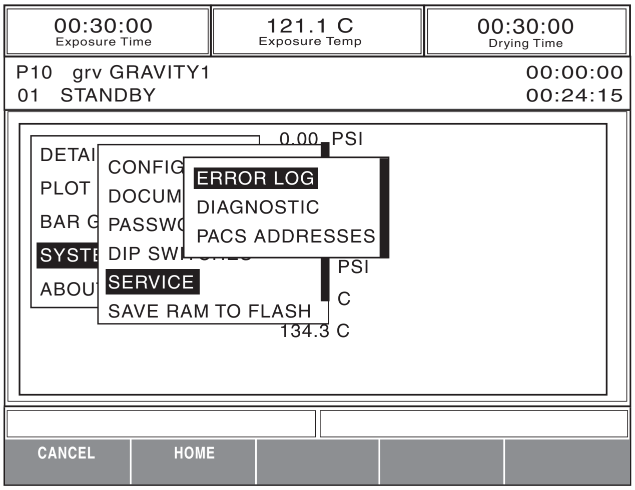
2. After service on the door is complete, reinstall the door cover, remove the jumper, and set DS20 to 0.

SERVICE MENU

The SERVICE menu has three options:

- ERROR LOG
- DIAGNOSTIC
- PACS ADDRESSES

FIGURE 5–42. SERVICE MENU


00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
00:00:00
01 STANDBY
00:24:15
DETAI
PLOT
BAR G
SYSTE
ABOUT
CONFIG
DOCUM
PASSWO
DIP SWI
SERVICE
SAVE RAM TO FLASH
ERROR LOG
DIAGNOSTIC
PACS ADDRESSES
0.00 PSI
PSI
C
134.3 C
CANCEL
HOME

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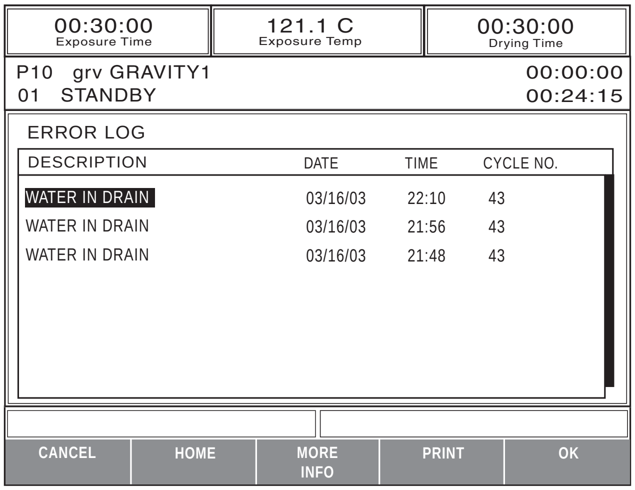
ERROR LOG

The ERROR LOG screen records all diagnostic messages along with the date, time, and cycle number (cycle count).

FIGURE 5–43. ERROR LOG SCREEN


00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
00:00:00
01 STANDBY
00:24:15
ERROR LOG
CANCEL
HOME
MORE INFO
PRINT
OK

DESCRIPTION	DATE	TIME	CYCLE NO.
WATER IN DRAIN	03/16/03	22:10	43
WATER IN DRAIN	03/16/03	21:56	43
WATER IN DRAIN	03/16/03	21:48	43

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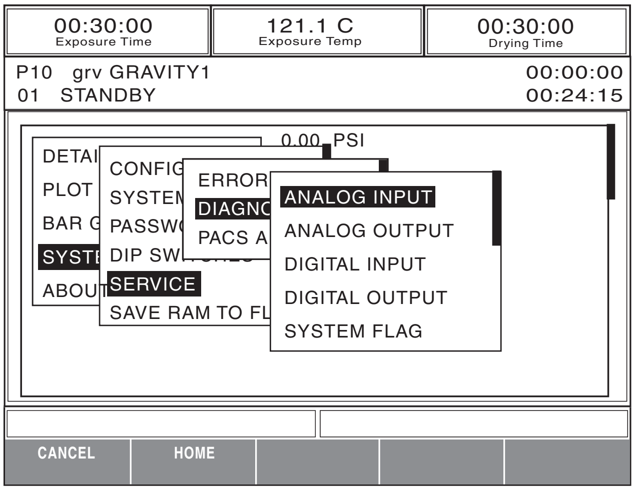
DIAGNOSTIC MENU

The DIAGNOSTIC menu has eight options:

- ANALOG INPUTS
- ANALOG OUTPUTS
- DIGITAL INPUTS
- DIGITAL OUTPUTS
- SYSTEM FLAGS
- USER FLAGS
- PRINTER
- LEDS/BUZZER

FIGURE 5–44. DIAGNOSTIC MENU



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15
0.00 PSI

DETAI
PLOT
BAR G
SYSTE
ABOUT
CONFIG
SYSTEM
PASSWO
DIP SW
SERVICE
SAVE RAM TO FL
ERROR
DIAGNO
PACS A
ANALOG INPUT
ANALOG OUTPUT
DIGITAL INPUT
DIGITAL OUTPUT
SYSTEM FLAG
CANCEL
HOME
WS-0075

The use of these options is described in *“Trouble Analysis” on page 8–17*.

SAVE RAM TO FLASH

Whenever the customer requests changes to the cycles, such as renaming and resequencing the cycles, it is good practice to save these changes to the EPROM.

SAVING THE PROGRAM IN RAM TO THE FLASH EPROM

To save the RAM to the EPROM:

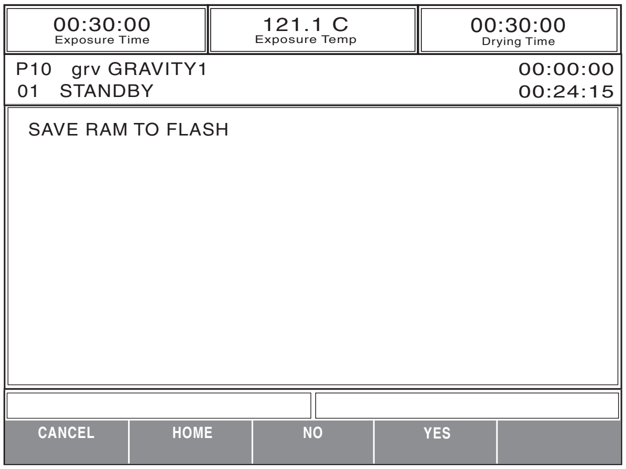
1. Press [SETUP].

SERVICE
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SAVE RAM TO FLASH.
3. Press ENTER.

   The SAVE RAM TO FLASH screen appears.

FIGURE 5–45. SAVE RAM TO FLASH SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

SAVE RAM TO FLASH

4. Press [YES].

NOTE

The loading process takes approximately 10 to 15 seconds. During the loading process, a “Saving RAM to FLASH “progress message appears.

---

5. If the screen displays an error message:
   a. Verify that the EPROM is properly seated.
   b. If necessary, replace the EPROM (*see “Flash EPROM” on page 10–7*).

SECTION 6 DRAWINGS

TABLE 6–1. LIST OF DRAWINGS

Figure	Drawing	Drawing No.	Page
6-1	Software Menu Tree	—	6–2
6-2	Piping and Instrument Drawing (P&ID)	PI0036	6–4
6-3	Process Diagram, 633HC	PP0025	6–5
6-4	Process Diagram, 633LS	PP0027	6–9
6-5	System Wiring Diagram	W1343	6–14
6-6	Power Box 1A Wiring Diagram	61301608498	6–16
6-7	Control Box 2A Wiring Diagram	61301607085	6–18
6-8	Door I/F Box 15A/16A Wiring Diagram	61301607086	6–20
6-9	Optional Equipment Wiring Diagram	W1306	6–22
6-10	System Electrical Schematic	W1344	6–24
6-11	Power Box Electrical Schematic	W1304	6–25
6-12	I/O I/F PCB Electrical Schematic	W1350	6–26
6-13	Power Doors Electrical Schematic	W1345	6–29
6-14	GTS-30A Steam Boiler	700576	6–30
6-15	CAS-45A Steam Boiler	700591	6–32
6-17	MP-129F Water-Saver Wiring Diagram	W1320	6–35
6-18	Roughing-In Drawing	HS4125	6–36
6-19	Seismic Anchorage Drawing	700601	6–40

FIGURE 6–1, SHEET 1. SOFTWARE MENU TREE

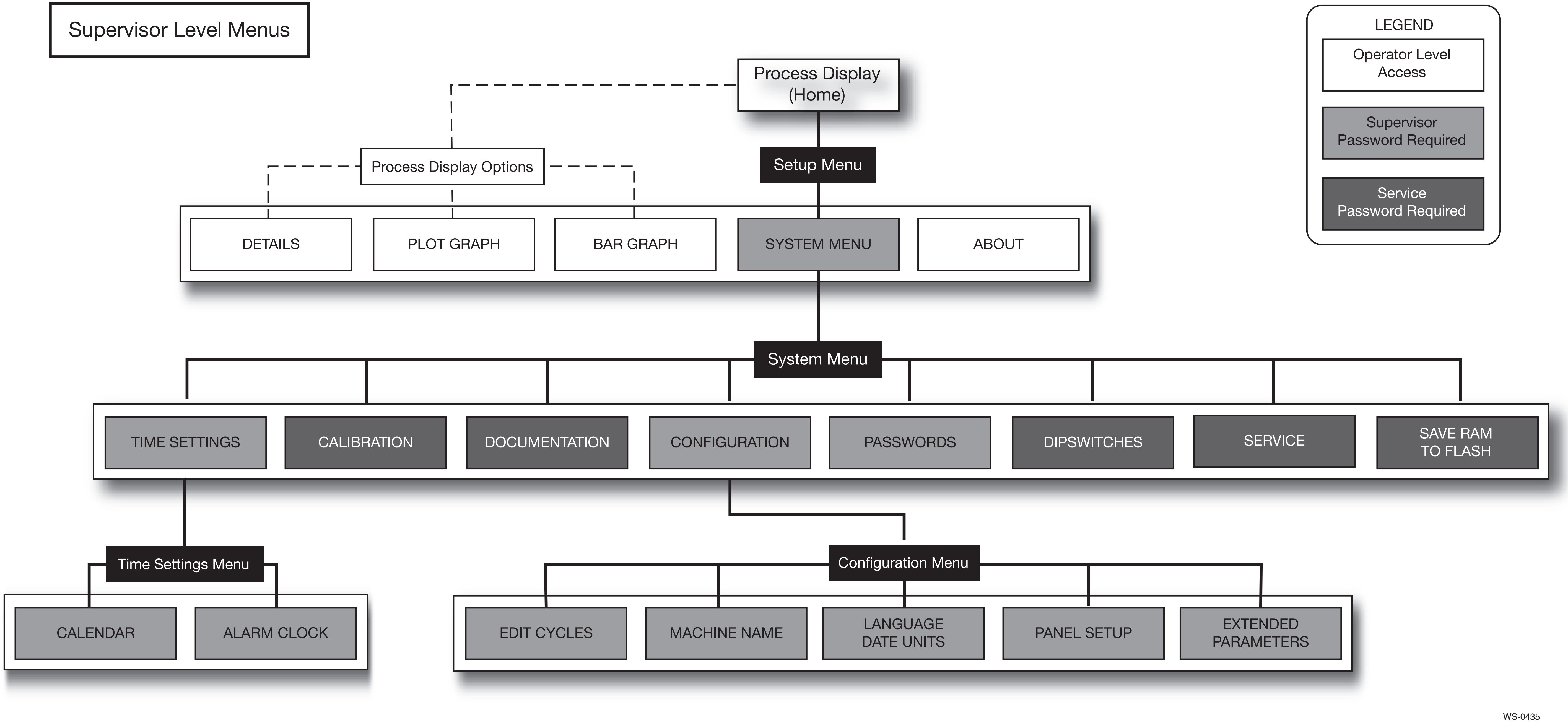
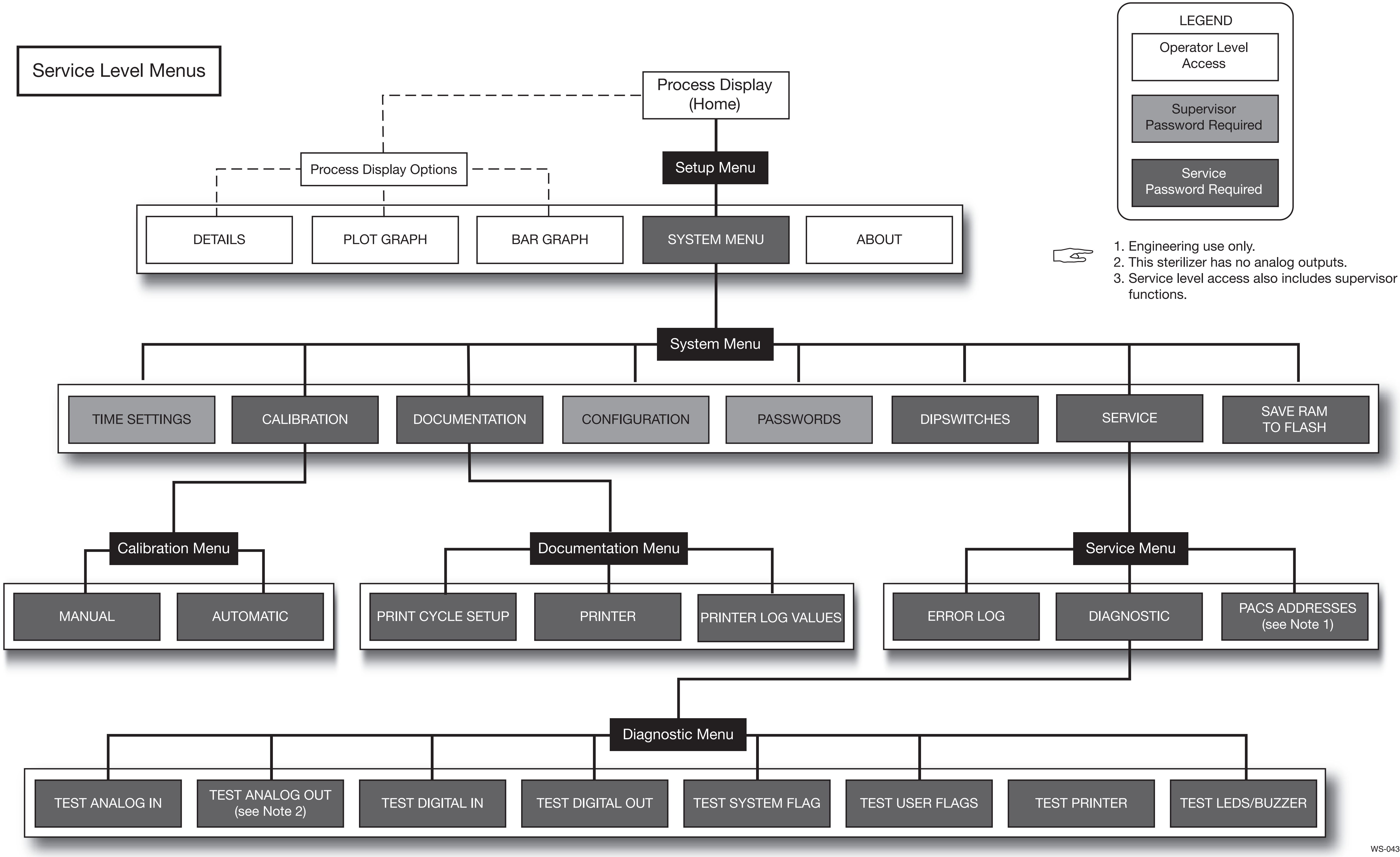
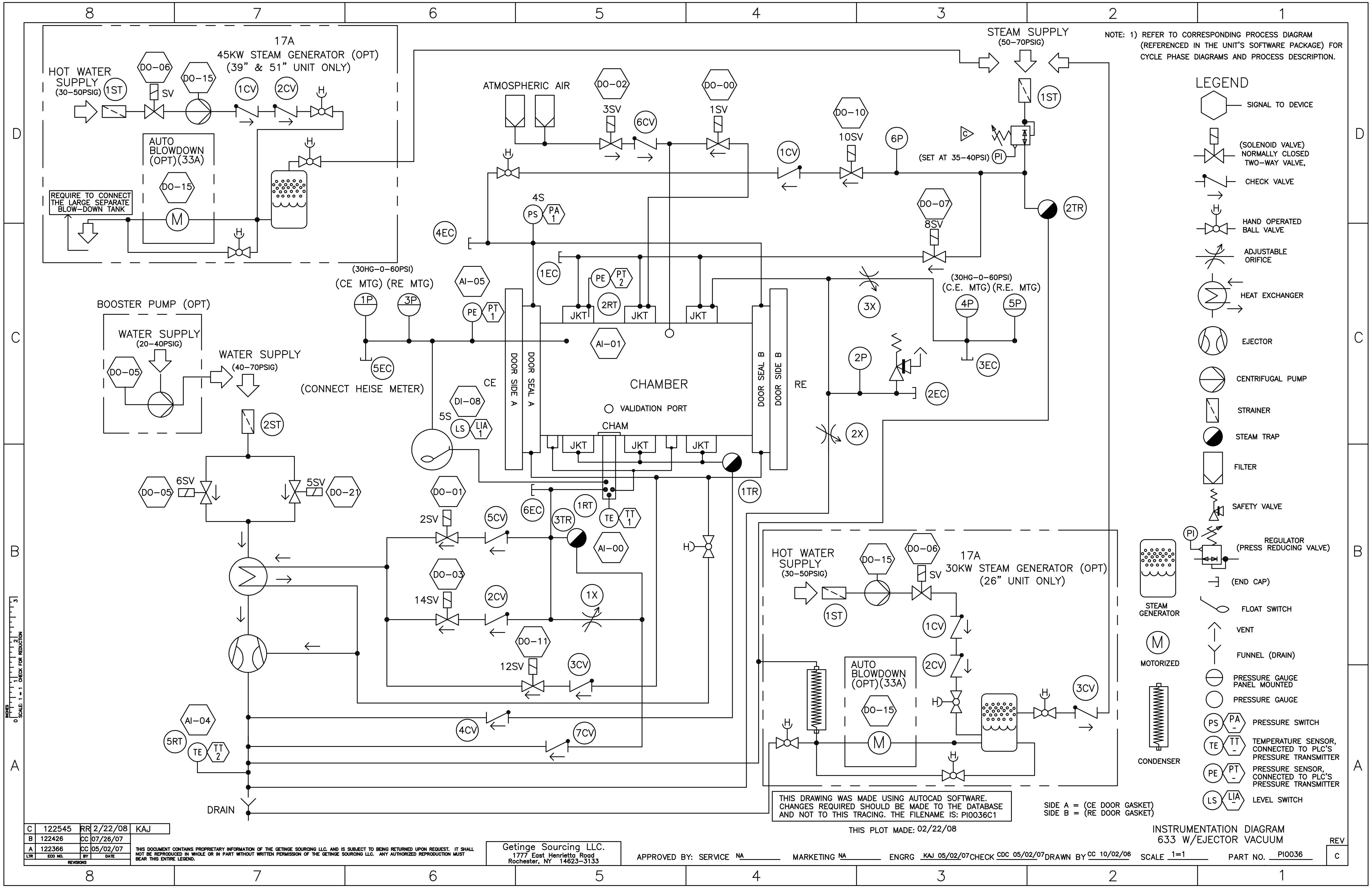

Supervisor Level Menus
LEGEND
Operator Level Access
Supervisor Password Required
Service Password Required
Process Display (Home)
Process Display Options
Setup Menu
DETAILS
PLOT GRAPH
BAR GRAPH
SYSTEM MENU
ABOUT
System Menu
TIME SETTINGS
CALIBRATION
DOCUMENTATION
CONFIGURATION
PASSWORDS
DIPSWITCHES
SERVICE
SAVE RAM TO FLASH
Time Settings Menu
CALENDAR
ALARM CLOCK
Configuration Menu
EDIT CYCLES
MACHINE NAME
LANGUAGE DATE UNITS
PANEL SETUP
EXTENDED PARAMETERS
WS-0435

FIGURE 6–1, SHEET 2. SOFTWARE MENU TREE


LEGEND
Operator Level Access
Supervisor Password Required
Service Password Required
Service Level Menus
Process Display (Home)
Process Display Options
Setup Menu
DETAILS
PLOT GRAPH
BAR GRAPH
SYSTEM MENU
ABOUT
System Menu
TIME SETTINGS
CALIBRATION
DOCUMENTATION
CONFIGURATION
PASSWORDS
DIPSWITCHES
SERVICE
SAVE RAM TO FLASH
Calibration Menu
MANUAL
AUTOMATIC
Documentation Menu
PRINT CYCLE SETUP
PRINTER
PRINTER LOG VALUES
Service Menu
ERROR LOG
DIAGNOSTIC
PACS ADDRESSES (see Note 1)
Diagnostic Menu
TEST ANALOG IN
TEST ANALOG OUT (see Note 2)
TEST DIGITAL IN
TEST DIGITAL OUT
TEST SYSTEM FLAG
TEST USER FLAGS
TEST PRINTER
TEST LEDS/BUZZER
WS-0436

☞
1. Engineering use only.
2. This sterilizer has no analog outputs.
3. Service level access also includes supervisor functions.

FIGURE 6–2. PIPING AND INSTRUMENT DRAWING (P&ID)


8
7
6
5
4
3
2
1
D
C
B
A
17A
45KW STEAM GENERATOR (OPT)
(39" & 51" UNIT ONLY)
HOT WATER SUPPLY
(30–50PSIG)
1ST
DO–06
SV
DO–15
1CV
2CV
H
AUTO BLOWDOWN (OPT)(33A)
DO–15
REQUIRE TO CONNECT THE LARGE SEPARATE BLOW–DOWN TANK
M
ATMOSPHERIC AIR
DO–02
3SV
6CV
DO–00
1SV
DO–10
10SV
1CV
6P
STEAM SUPPLY
(50–70PSIG)
1ST
(SET AT 35–40PSI)
PI
2TR
DO–07
8SV
4S
PS
PA 1
4EC
1EC
PE
PT 2
2RT
JKT
AI–01
(30HG–0–60PSI)
(CE MTG) (RE MTG)
1P
3P
AI–05
PE
PT 1
3X
(30HG–0–60PSI)
(C.E. MTG) (R.E. MTG)
4P
5P
3EC
2P
2EC
BOOSTER PUMP (OPT)
WATER SUPPLY
(20–40PSIG)
DO–05
WATER SUPPLY
(40–70PSIG)
5EC
(CONNECT HEISE METER)
DI–08
CE
DOOR SIDE A
DOOR SEAL A
CHAMBER
VALIDATION PORT
CHAM
DOOR SEAL B
DOOR SIDE B
RE
5S
LS
LIA 1
2ST
2X
6SV
DO–05
5SV
DO–21
DO–01
2SV
5CV
6EC
1RT
3TR
TE
TT 1
1TR
AI–00
H
DO–03
14SV
2CV
1X
DO–11
12SV
3CV
4CV
7CV
AI–04
5RT
TE
TT 2
DRAIN
HOT WATER SUPPLY
(30–50PSIG)
DO–15
DO–06
SV
17A
30KW STEAM GENERATOR (OPT)
(26" UNIT ONLY)
1ST
1CV
2CV
AUTO BLOWDOWN (OPT)(33A)
DO–15
M
3CV
LEGEND
SIGNAL TO DEVICE
(SOLENOID VALVE) NORMALLY CLOSED TWO–WAY VALVE,
CHECK VALVE
HAND OPERATED BALL VALVE
ADJUSTABLE ORIFICE
HEAT EXCHANGER
EJECTOR
CENTRIFUGAL PUMP
STRAINER
STEAM TRAP
FILTER
SAFETY VALVE
PI
REGULATOR (PRESS REDUCING VALVE)
(END CAP)
STEAM GENERATOR
FLOAT SWITCH
M
MOTORIZED
VENT
FUNNEL (DRAIN)
PRESSURE GAUGE PANEL MOUNTED
PRESSURE GAUGE
PS PA –
PRESSURE SWITCH
TE TT –
TEMPERATURE SENSOR, CONNECTED TO PLC'S PRESSURE TRANSMITTER
CONDENSER
PE PT –
PRESSURE SENSOR, CONNECTED TO PLC'S PRESSURE TRANSMITTER
LS LIA –
LEVEL SWITCH
INCHES 0 1 2 3 SCALE 1 = 1 CHECK FOR REDUCTION
SIDE A = (CE DOOR GASKET)
SIDE B = (RE DOOR GASKET)
THIS PLOT MADE: 02/22/08
INSTRUMENTATION DIAGRAM
633 W/EJECTOR VACUUM
Getinge Sourcing LLC.
1777 East Henrietta Road
Rochester, NY 14623–3133
APPROVED BY: SERVICE NA
MARKETING NA
ENGRG KAJ 05/02/07
CHECK CDC 05/02/07
DRAWN BY CC 10/02/06
SCALE 1=1
PART NO. PI0036
REV C

NOTE: 1) REFER TO CORRESPONDING PROCESS DIAGRAM (REFERENCED IN THE UNIT'S SOFTWARE PACKAGE) FOR CYCLE PHASE DIAGRAMS AND PROCESS DESCRIPTION.

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FIGURE 6–3, SHEET 1. PROCESS DIAGRAM, 633HC

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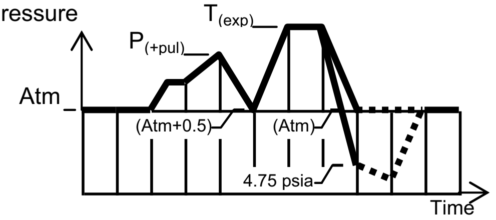
	Approved: ATR 07/11/07	File Type: MS Excel 97	Class Code: 8104		Page: 1 of 5

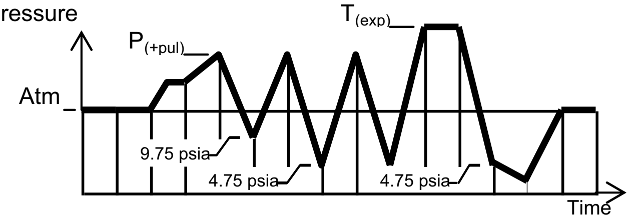
grv GRAVITY 1 Cycle	5 pulses
grv GRAVITY 2 Cycle	5 pulses
f 3 FLASH 3+ Cycle	0 pulses
f10 FLASH 10+ Cycle	2 pulses



			PH0000	PH0500	PH1100	PH1200		PH1800	PH2000	PH3100	PH3110	PH3800	PH4000
Steam to Chamber	1SV	DO00			X	X		C	C				
Chamber Drain	2SV	DO01	D	X	X		X			X	X		D
Chamber Air-In	3SV	DO02	D	X							S	X	D
Secondary Drain	14SV	DO03						C	C				
Water to Ejector	6SV	DO05	D		C	C	X			X	X		D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D										D

Cycle Phase No.: PH0000, PH0500, PH1100, PH1200, PH1800, PH2000, PH3100, PH3110, PH3800, PH4000

vac PREVAC 1 Cycle	3 pulses
vac PREVAC 2 Cycle	3 pulses
vac B-D TEST Cycle	3 pulses

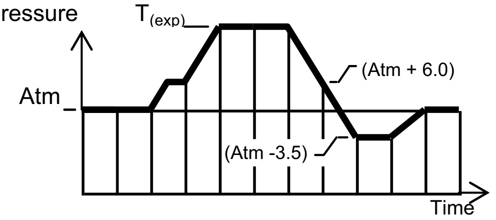


			PH0000	PH0500	PH1100	PH1200		PH1200		PH1200		PH1800	PH2000	PH3100	PH3110	PH3800	PH4000
Steam to Chamber	1SV	DO00			X	X		X		X		C	C				
Chamber Drain	2SV	DO01	D	X	X		X		X		X			X	X		D
Chamber Air-In	3SV	DO02	D	X												X	D
Secondary Drain	14SV	DO03										C	C				
Water to Ejector	6SV	DO05	D		C	C	X	C	X	C	X			X	X		D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D														D

Cycle Phase No.: PH0000, PH0500, PH1100, PH1200, PH1200, PH1200, PH1800, PH2000, PH3100, PH3110, PH3800, PH4000

NOTES:
1) Refer to pg 3 for charts, keys & other notes.
2) Refer to pg 4-5 for cycle phase descriptions.

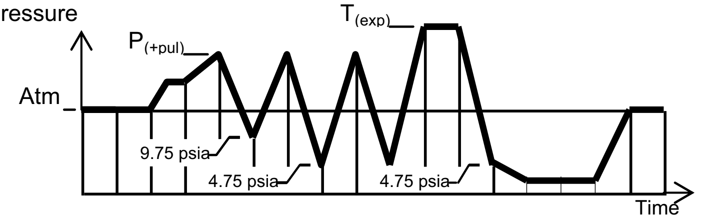
liq LIQUIDS 1 Cycle
liq LIQUIDS 2 Cycle



			PH0000	PH0500	PH1100	PH1890	PH1990	PH2090	PH3190			PH3800	PH4000
Steam to Chamber	1SV	DO00			X	C	C	C	X	X	X		
Chamber Drain	2SV	DO01	D	X	X								D
Chamber Air-In	3SV	DO02	D	X							X	X	D
Secondary Drain	14SV	DO03				C	C	C	C	C	C		
Water to Ejector	6SV	DO05	D		C					X	X		D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C					
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D										D

Cycle Phase No.: PH0000, PH0500, PH1100, PH1890, PH1990, PH2090, PH3190, PH3800, PH4000

lkt LEAK TEST Cycle	3 pulses



			PH0000	PH0500	PH1100	PH1200		PH1200		PH1200		PH1800	PH2000	PH3100	PH3110	PH3700	PH3710	PH3800	PH4000
Steam to Chamber	1SV	DO00			X	X		X		X		C	C						
Chamber Drain	2SV	DO01	D	X	X		X		X		X			X	X				D
Chamber Air-In	3SV	DO02	D	X														X	D
Secondary Drain	14SV	DO03										C	C						
Water to Ejector	6SV	DO05	D		C	C	X	C	X	C	X			X	X				D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D																D

Cycle Phase No.: PH0000, PH0500, PH1100, PH1200, PH1200, PH1200, PH1800, PH2000, PH3100, PH3110, PH3700, PH3710, PH3800, PH4000

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FIGURE 6–3, SHEET 2. PROCESS DIAGRAM, 633HC

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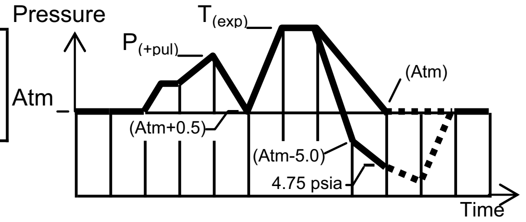
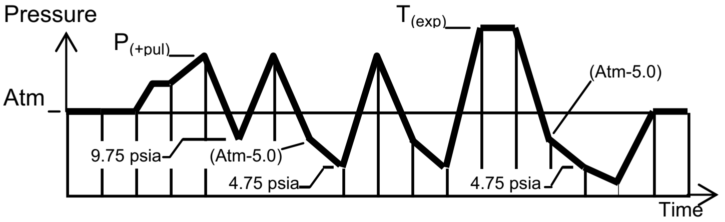
grv GRAVITY 1 Cycle	5 pulses
grv GRAVITY 2 Cycle	5 pulses
f 3 FLASH 3+ Cycle	0 pulses
f10 FLASH 10+ Cycle	2 pulses
with water saver	



			PH0000	PH0500	PH1100	PH1200		PH1800	PH2000	PH3100		PH3110	PH3800	PH4000
Steam to Chamber	1SV	DO00			X	X		C	C					
Chamber Drain	2SV	DO01	D	X	X		X			X	X*			D
Chamber Air-In	3SV	DO02	D	X								S	X	D
Secondary Drain	14SV	DO03						C	C					
Water to Ejector	6SV	DO05	D		C	C	X			X	X*			D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D											D
Water Saver On	15SV	DO14									X*	X		

Cycle Phase No.:

vac PREVAC 1 Cycle	3 pulses
vac PREVAC 2 Cycle	3 pulses
vac B-D TEST Cycle	3 pulses
with water saver	

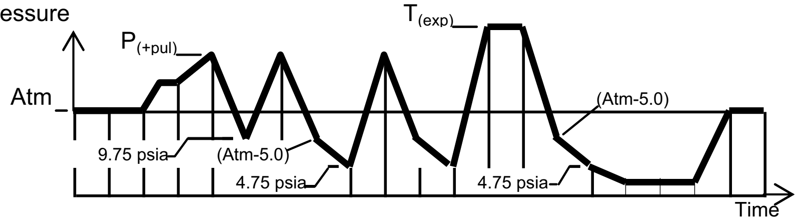


			PH0000	PH0500	PH1100	PH1200		PH1200			PH1200			PH1800	PH2000	PH3100		PH3110	PH3800	PH4000
Steam to Chamber	1SV	DO00			X	X		X			X			C	C					
Chamber Drain	2SV	DO01	D	X	X		X		X			X				X				D
Chamber Air-In	3SV	DO02	D	X															X	D
Secondary Drain	14SV	DO03												C	C					
Water to Ejector	6SV	DO05	D		C	C	X	C	X		C	X				X				D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D																	D
Water Saver On	15SV	DO14								X			X				X	X		

Cycle Phase No.:

NOTES:
1) X* - For Vac. Dry: DO14 is ON, DO01 & DO05 are OFF.
For Grav. Dry: DO14 is OFF, DO01 & DO05 are ON.
2) Refer to pg 3 for charts, keys & other notes.
3) Refer to pg 4-5 for cycle phase descriptions.

lkt LEAK TEST Cycle	3 pulses
with water saver	



			PH0000	PH0500	PH1100	PH1200		PH1200			PH1200			PH1800	PH2000	PH3100		PH3110	PH3700	PH3710	PH3800	PH4000
Steam to Chamber	1SV	DO00			X	X		X			X			C	C							
Chamber Drain	2SV	DO01	D	X	X		X		X			X				X						D
Chamber Air-In	3SV	DO02	D	X																	X	D
Secondary Drain	14SV	DO03												C	C							
Water to Ejector	6SV	DO05	D		C	C	X	C	X		C	X				X						D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D																			D
Water Saver On	15SV	DO14								X			X				X	X				

Cycle Phase No.:

For units with WATER SAVER PKG ONLY

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FIGURE 6–3, SHEET 3. PROCESS DIAGRAM, 633HC

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FACTORY SETTINGS

Cycle			**Exposure**		**Drying**		
No.	Type	Type	T(exp) °F (°C)	Time (min.)	Type	P(dry) (PSIA)	Time (mm:ss)
P1	vac	PREVAC 1	275.0 (135.0)	3	vac	4.75	16:00
P2	vac	PREVAC 1	275.0 (135.0)	3	vac	4.75	16:00
P3	vac	PREVAC 1	275.0 (135.0)	3	vac	4.75	16:00
P4	vac	PREVAC 1	275.0 (135.0)	3	vac	4.75	16:00
P5	vac	PREVAC 1	275.0 (135.0)	3	vac	4.75	16:00
P6	vac	PREVAC 1	275.0 (135.0)	3	vac	4.75	16:00
P7	vac	PREVAC 2	275.0 (135.0)	3	vac	4.75	03:00
P8	vac	PREVAC 2	275.0 (135.0)	3	vac	4.75	03:00
P9	vac	B-D TEST	273.0 (133.9)	3.5	vac	4.75	00:00
P10	grv	GRAVITY 1	250.0 (121.1)	30	grv	atm	30:00
P11	grv	GRAVITY 1	250.0 (121.1)	30	grv	atm	30:00
P12	grv	GRAVITY 1	250.0 (121.1)	30	grv	atm	30:00
P13	grv	GRAVITY 2	275.0 (135.0)	10	grv	atm	30:00
P14	grv	GRAVITY 2	275.0 (135.0)	10	grv	atm	30:00
P15	grv	GRAVITY 2	275.0 (135.0)	10	grv	atm	30:00
P16	f3	FLASH 3+	275.0 (135.0)	3	vac	4.75	00:30
P17	f3	FLASH 3+	275.0 (135.0)	3	vac	4.75	00:30
P18	f10	FLASH 10+	275.0 (135.0)	10	vac	4.75	00:30
P19	f10	FLASH 10+	275.0 (135.0)	10	vac	4.75	00:30
P20	liq	LIQUIDS 1	250.0 (121.1)	45	n/a	n/a	n/a
P21	lkt	LEAKTEST	268.0 (131.1)	3	vac	4.75	n/a

FACTORY RAMP RATE SETTINGS

Cycle Phase				
No.	Description	SV No.	Ramp Rate (PSI/Min.)	Comments
PH1200	Conditioning (Pos)	1SV	72.5	non-adjustable
PH1200	Conditioning (Neg)	2SV	72.5	non-adjustable
PH1800	Heat Up	1SV, 14SV	*varying*	non-adjustable
PH1890	Liquid Heat Up	1SV, 14SV	*varying*	non-adjustable
PH3190	Liquid Exhaust	14SV	0.75	Supervisor adjustable

NOTES:

1) Refer to Instrumentation Diagram PI0036 for piping schematics and hardware references.

2) Pressure vs. Time cycle phase diagrams are not to scale

3) Drain Cooling is software controlled via DO05 Water to Ejector

4) Factory Setting for Liquid Dwell Time = 8 minutes

5) 1SV, 2SV & 14SV in some phases are controlled with a fixed limit ramp rate of 72.5 PSI/min (see Factory Ramp Rate Settings Table). Normally during these phases, the SV's energize fully and are indicated as such in the phase diagrams and the Cycle Phase Descriptions.

6) Additional outputs applicable to units with steam generators:
   a) "Boiler ON" (DO06) turns ON the steam generator while controls are ON (except during auto blowdown or utility shut-off condition).
   b) "Boiler Blowdown" (DO15) turns ON during an auto blowdown event.

LEGEND for Cycle Phase Diagrams:

X	Energized
☐	De-energized
C	Controlled
S	Energized per selection (e.g. Gravity Dry vs. Vac Dry)
D	Energized per door status
SV	Solenoid Valve
DO	Digital Output (Software reference)

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FIGURE 6–3, SHEET 4. PROCESS DIAGRAM, 633HC

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Cycle Phase Descriptions:

PH0000 – STANDBY: Jacket temperature control is enabled. Jacket RTD maintains temperature by energizing and de-energizing 8SV. 8SV maintains steam to jacket throughout the cycle unless noted in the phase description. Also throughout the cycle, drain temperature is software controlled. 6SV (water to ejector) is energized when the drain temperature is greater than 60°C (or 140°F, service adjustable parameter) and de-energizes when the drain temperature falls below 55°C (the 5°C difference is a service adjustable parameter).

PH0500 – CYCLE START: Cycle Start button is pressed, door(s) seals per PH0110/PH0130 described below. Once jacket temperature is within +4.4 / -2.2°C (+8.0 / -4°F) of T(exp), the phase is complete.

PH01100 – PURGE: 1SV & 2SV energize. Steam enters the chamber through 1SV and purges chamber of air through 2SV. 6SV energizes if chamber pressure exceeds 2 PSI above atmosphere and de-energizes if pressure falls 1 PSI below atmosphere. Cooling water from 6SV condenses steam at ejector and flows to drain. After the purge time, 1SV, 2SV & 6SV de-energize and the phase is complete. Note: 51" model has a purge time of 00:02:30 (hh:mm:ss). 26" model purge times are as follows: vac cycles have 00:01:30 and non-vac cycles have 00:02:30.

PH1200 – CONDITIONING: Note: This phase may be repeated based on the quantity of pulses programmed.

- Steam pressurizes chamber through energized 1SV. When the chamber pressure is above 30.00 psia or is greater than the exposure set point – 5.2°C, as a pressure, 6SV turns on for the remainder of the positive pulse. When chamber pressure reaches P(+pul) (T(exp) – 2.2°C (or 4.0°F) converted to steam pressure, but no greater than 32.0 PSIA), 1SV de-energizes and 2SV & 6SV energize. Chamber steam is exhausted to ejector, condensed and drained.
- **For Gravity or Flash 10+ Cycles:** When chamber pressure reaches 0.5 PSI above atmosphere, 2SV & 6SV de-energizes and the phase is complete.
- **For PreVac, B-D TEST or LEAK TEST Cycles – 1st Pulse only:** When chamber pressure reaches 9.75 PSIA, 2SV & 6SV de-energizes and the phase is complete.
- **For PreVac, B-D TEST or LEAK TEST Cycles – 2nd & 3rd Pulses only:** When chamber pressure reaches 4.75 PSIA, 2SV & 6SV de-energizes and the phase is complete.
- **For PreVac , B-D TEST or LEAK TEST w/ water saver:** When chamber pressure reaches 5.0 PSI below atmosphere, 2SV & 6SV de-energizes. 15SV energizes until 4.75 psia is reached and the phase is complete.

PH1800 – HEAT-UP: 1SV energizes and steam pressurizes the chamber. As the chamber temperature approaches the programmed exposure temperature, 1SV & 14SV are controlled (via chamber RTD) to slow down the ascent. When the programmed exposure temperature +0.4°C (0.7°F) is reached (sensed by the chamber RTD), the phase is then complete. 14SV control is as follows:

- **26" model:**
  - **Vacuum cycles:** When the chamber pressure is greater than atm + 1.0, 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (2 sec on, 3 sec off) for the remainder of the phase.
  - **Gravity cycles:** 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (3 sec on, 2 sec off) for the remainder of the phase.
  - **Flash cycles:** 14SV is on until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (2 sec on, 3 sec off) for the remainder of the phase.
- **39" & 51" models:**
  - **Vacuum cycles:** When the chamber pressure is greater than atm + 1.0, 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (2 sec on, 3 sec off) for the remainder of the phase.
  - **Gravity cycles:** 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (3 sec on, 2 sec off) for the remainder of the phase.
  - **Flash cycles:** 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (2 sec on, 3 sec off) for the remainder of the phase.

PH1890 – LIQUID HEAT-UP: 1SV energizes and steam pressurizes the chamber. 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase. As the chamber temperature approaches the programmed exposure temperature, 1SV is controlled (via chamber RTD) to slow down the ascent. When the programmed exposure temperature is reached (sensed by the chamber RTD), the phase is then complete.

PH1990 – LIQUID DWELL: 1SV is controlled to maintain the selected exposure temperature & 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase. After a programmed time period, the phase is complete.

PH2000 – EXPOSURE: The programmed exposure timing begins. 1SV is controlled by the chamber RTD to maintain the selected exposure temperature. After the programmed exposure time expires, 1SV & 14SV de-energizes and the phase is complete. 14SV control is as follows:

- **26" and 51" models:** 14SV mimics 1SV for the entire phase.
- **39" model:** 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase.

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PH2090 – LIQUID EXPOSURE: The programmed exposure timing begins. 1SV is controlled by the chamber RTD to maintain the selected exposure temperature. 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase. After the programmed exposure time expires, 1SV & 14SV de-energizes and the phase is complete.

PH3100 – EXHAUST: 2SV & 6SV energize. Chamber steam is exhausted to ejector, condensed and drained.

- **For Gravity Drying:** When chamber pressure reaches atmosphere, 2SV & 6SV de-energizes and the phase is complete.
- **For Vacuum Drying (including B-D Test & Leak Test Cycles):** When chamber pressure reaches 4.75 PSIA, 2SV & 6SV de-energizes and the phase is complete.
- **For Vacuum Drying w/ water saver (including B-D Test & Leak Test Cycles):** When chamber pressure reaches 5.0 PSI below atmosphere, 2SV & 6SV de-energize. 15SV energizes until 4.75 psia is reached and the phase is complete.

PH3190 – LIQUID EXHAUST: 8SV de-energizes and 1SV energizes (this clears steam from the jacket). Chamber pressure is decreased at a programmed ramp rate by energizing and de-energizing 14SV. When chamber pressure reaches 6 PSI above atmosphere, 6SV energizes. When the chamber temp reaches 100.0°C / 212.0°F, the chamber pressure is decreased at half the programmed ramp rate. When chamber pressure (sensed by the chamber pressure transducer) cools to <= Atm – 3.5 psia, the phase is complete.

PH3110 – DRYING: The programmed dry timing begins. For unit with ejector only, 2SV & 6SV energize. For unit with a water saver, 15SV energizes. If Gravity Drying was selected, 3SV also energizes. When the time period elapses, 2SV, 3SV, 6SV & 15SV de-energize and the phase is complete. Note: For Leak Test cycle, the time in this phase is fixed at 15 minutes.

PH3700 – EQUALIZATION: All SV's, except for door and jacket control, are de-energized. After a dwell period of 5 minutes, the phase is complete.

PH3710 – LEAK TEST: All SV's, except for door and jacket control, are de-energized. Chamber pressure is initially checked. After 15 minutes, chamber pressure is checked again to determine leak rate and the phase is complete.

PH3800 – AIR-IN: 3SV energizes and, for Liquid cycles, 8SV remains de-energized. When chamber pressure is within 2 PSI of atmosphere, 3SV de-energizes and the phase is complete. Next, the controls proceed to either CE Unsealing or Doors Unsealing, depending on the door configuration.

PH4000 – CYCLE COMPLETE: 2SV & 3SV energize and, for Liquid cycles, 8SV remains de-energizes. The cycle complete buzzer sounds for 1 minute or until clear button is pressed. The door(s) automatically unsealed. When either door is opened, the buzzer will turn OFF (if not already OFF) and the phase is complete. Note: 2SV & 3SV de-energizes when door is unsealed (sensed by DI02).

SEALING DOOR(S):	**PH0110/0130 – CE SEALING/DOORS SEALING:** If the jacket has fallen below 100°C after the last seal, 6SV, 10SV and 12SV energize for 10 secs (service adjustable parameter) to heat the gasket before the door attempts to seal. Next, 10SV remains energized, 6SV and 12SV de-energies so the gasket groove is pressurized, sealing the chamber.
UNSEALING DOOR(S):	**PH0111/0131 – CE UNSEALING/DOORS UNSEALING:** 10SV remains energized. 12SV, 3SV & 6SV energize. After 4 seconds, 10SV de-energizes. Water to the ejector creates a vacuum in the gasket groove retracting the door gasket. After 30 seconds, 3SV & 6SV de-energizes and the phase is complete.

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FIGURE 6–4, SHEET 1. PROCESS DIAGRAM, 633LS

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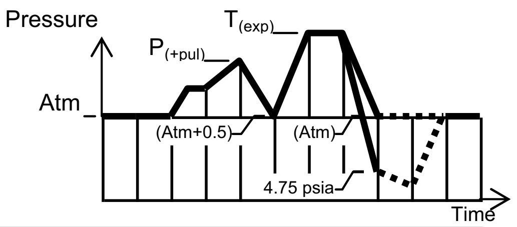
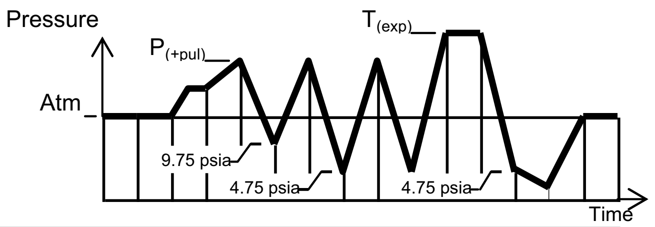
grv GRAVITY 1 Cycle



Steam to Chamber	1SV	DO00			X	R		C	C				
Chamber Drain	2SV	DO01	D	X	X		R			R	X		D
Chamber Air-In	3SV	DO02	D	X							S	R	D
Secondary Drain	14SV	DO03						C	C				
Water to Ejector	6SV	DO05	D		C	C	X			X	X		D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D										D
		Cycle Phase No.:	PH0000	PH0500	PH1100	PH1200		PH1800	PH2000	PH3100	PH3110	PH3800	PH4000

vac PREVAC 1 Cycle

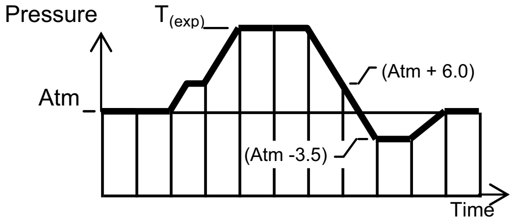


Steam to Chamber	1SV	DO00			X	R		R		R		C	C				
Chamber Drain	2SV	DO01	D	X	X		R		R		R			R	X		D
Chamber Air-In	3SV	DO02	D	X												R	D
Secondary Drain	14SV	DO03										C	C				
Water to Ejector	6SV	DO05	D		C	C	X	C	X	C	X			X	X		D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D														D
		Cycle Phase No.:	PH0000	PH0500	PH1100	PH1200		PH1200		PH1200		PH1800	PH2000	PH3100	PH3110	PH3800	PH4000

NOTES:

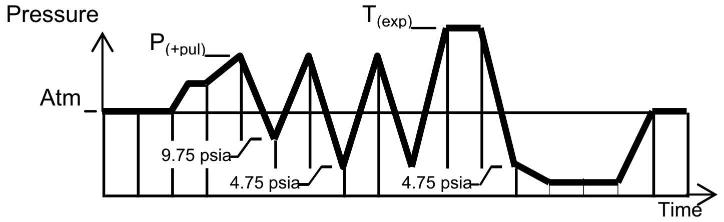
1) Refer to pg 3 for charts, keys & other notes.
2) Refer to pg 4-5 for cycle phase descriptions.

liq LIQUIDS 1 Cycle



Steam to Chamber	1SV	DO00			X	C	C	C	X	X	X		
Chamber Drain	2SV	DO01	D	X	X								D
Chamber Air-In	3SV	DO02	D	X							X	R	D
Secondary Drain	14SV	DO03				C	C	C	R	R	R		
Water to Ejector	6SV	DO05	D		C					X	X		D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C					
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D										D
		Cycle Phase No.:	PH0000	PH0500	PH1100	PH1890	PH1990	PH2090	PH3190			PH3800	PH4000

lkt LEAKTEST Cycle



Steam to Chamber	1SV	DO00			X	R		R		R		C	C						
Chamber Drain	2SV	DO01	D	X	X		R		R		R			R	X				D
Chamber Air-In	3SV	DO02	D	X														R	D
Secondary Drain	14SV	DO03										C	C						
Water to Ejector	6SV	DO05	D		C	C	X	C	X	C	X			X	X				D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D																D
		Cycle Phase No.:	PH0000	PH0500	PH1100	PH1200		PH1200		PH1200		PH1800	PH2000	PH3100	PH3110	PH3700	PH3710	PH3800	PH4000

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FIGURE 6–4, SHEET 2. PROCESS DIAGRAM, 633LS

Getinge Sourcing, LLC 1777 East Henrietta Road Rochester, NY 14623-3133	Doc. Name: **Process Diagram, 633LS**	Doc. No.: **PP0027**	Rev.: **A**
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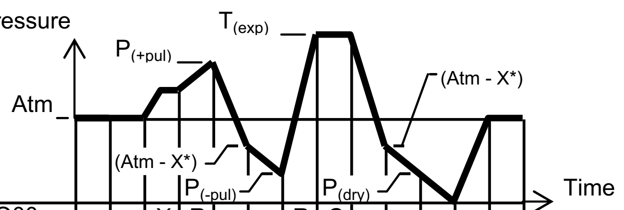
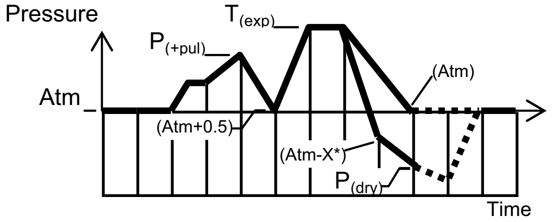
vac PREVAC 1 Cycle
with Vacuum Pump
or Water Saver



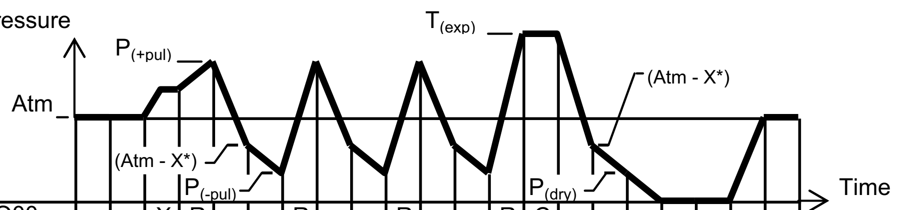
Steam to Chamber	1SV	DO00			X	R			R	C					
Chamber Drain	2SV	DO01	D	X	X		R				R				D
Chamber Air-In	3SV	DO02	D	X										R	D
Secondary Drain	14SV	DO03							C	C	X	X	X	X	
Water to Ejector	6SV	DO05			C		X				X				D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C
Drain to Vac Pmp	18SV	DO22						X*				X*	X*		
Vent to Vac Pmp	19SV	DO22	X	X	X	X	X	X*	X	X	X	X*		X	X
Vac Pmp & Water	5B/17SV	DO23						X*				X*	X*		
Water Saver On	15SV	DO14						X*				X*	X*		
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO12	D												D
		Cycle Phase No.:	PH0000	PH0500	PH1100	PH1200			PH1800	PH2000	PH3100		PH3110	PH3800	PH4000

grv GRAVITY1 Cycle
with Vacuum Pump
or Water Saver



Steam to Chamber	1SV	DO00			X	R		R	C					
Chamber Drain	2SV	DO01	D	X	X		R			R				D
Chamber Air-In	3SV	DO02	D	X								S	R	D
Secondary Drain	14SV	DO03						C	C	X	X	X	X	
Water to Ejector	6SV	DO05			C		X			X				D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C
Drain to Vac Pmp	18SV	DO22									X*	X*		
Vent to Vac Pmp	19SV	DO22	X	X	X	X	X	X	X	X	X*		X	X
Vac Pmp & Water	5B/17SV	DO23									X*	X*		
Water Saver On	15SV	DO14									X*	X*		
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO11	D											D
		Cycle Phase No.:	PH0000	PH0500	PH1100	PH1200		PH1800	PH2000	PH3100		PH3110	PH3800	PH4000

Leak Test (lkt) Cycle
with Vacuum Pump
or Water Saver



Steam to Chamber	1SV	DO00			X	R			R			R			R	C							
Chamber Drain	2SV	DO01	D	X	X		R			R			R				R						D
Chamber Air-In	3SV	DO02	D	X																		R	D
Secondary Drain	14SV	DO03													C	C	X	X	X	X	X	X	
Water to Ejector	6SV	DO05			C		X			X			X				X						D
Steam to Jacket	8SV	DO07	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Drain to Vac Pmp	18SV	DO22						X*			X*			X*				X*	X*				
Vent to Vac Pmp	19SV	DO22	X	X	X	X	X	X*	X	X	X*	X	X	X*	X	X	X	X*		X	X	X	X
Vac Pmp & Water	5B/17SV	DO23						X*			X*			X*				X*	X*				
Water Saver On	15SV	DO14						X*			X*			X*				X*	X*				
CE & RE Door Seal	10SV	DO10	D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	D
CE & RE Door Unseal	12SV	DO12	D																				D
		Cycle Phase No.:	PH0000	PH0500	PH1100	PH1200			PH1200			PH1200			PH1800	PH2000	PH3100		PH3110	PH3700	PH3710	PH3800	PH4000

NOTES:

1) Refer to pg 3 for charts, keys & other notes.
2) Refer to pg 4-5 for cycle phase descriptions.
X*) Water Saver configured: DO14 is on.
DO22 and DO23 are off.
Trip-point: Atm - 5.0 psia
Vacuum Pump configured: DO14 is off.
DO22 (ramps) and DO23 are on.
Trip-point: Atm - 2.0 psia

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FIGURE 6–4, SHEET 3. PROCESS DIAGRAM, 633LS

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FACTORY SETTINGS

Cycle			Purge	Conditioning Pulses			Exposure		Drying		
No.	Type	Name	Time (min.)	Qty.	P(+pul) (PSIA)	P(-pul) (PSIA)**	T(exp) °C (°F)	Time (min.)	Type	P(dry) (PSIA)	Time (min.)
P1	vac	PREVAC 1	2	3	30	9.75/4.75	121.1 250.0	30	vac	4.75	30:00
P2	vac	PREVAC 1	2	3	30	9.75/4.75	121.1 250.0	30	vac	4.75	30:00
P3	vac	PREVAC 1	2	3	30	9.75/4.75	121.1 250.0	30	vac	4.75	30:00
P4	vac	PREVAC 1	2	3	30	9.75/4.75	121.1 250.0	30	vac	4.75	30:00
P5	vac	PREVAC 1	2	3	30	9.75/4.75	121.1 250.0	30	vac	4.75	30:00
P6	vac	PREVAC 1	2	3	30	9.75/4.75	121.1 250.0	30	vac	4.75	30:00
P7	grv	GRAVITY 1	2	5	30	atm + 0.5	121.1 250.0	30	grv	atm	30:00
P8	grv	GRAVITY 1	2	5	30	atm + 0.5	121.1 250.0	30	grv	atm	30:00
P9	grv	GRAVITY 1	2	5	30	atm + 0.5	121.1 250.0	30	grv	atm	30:00
P10	grv	GRAVITY 1	2	5	30	atm + 0.5	121.1 250.0	30	grv	atm	30:00
P11	grv	GRAVITY 1	2	5	30	atm + 0.5	121.1 250.0	30	grv	atm	30:00
P12	grv	GRAVITY 1	2	5	30	atm + 0.5	121.1 250.0	30	grv	atm	30:00
P13	liq	LIQUIDS 1	2	n/a	n/a	n/a	121.1 250.0	30	n/a	n/a	n/a
P14	liq	LIQUIDS 1	2	n/a	n/a	n/a	121.1 250.0	30	n/a	n/a	n/a
P15	liq	LIQUIDS 1	2	n/a	n/a	n/a	121.1 250.0	30	n/a	n/a	n/a
P16	liq	LIQUIDS 1	2	n/a	n/a	n/a	121.1 250.0	30	n/a	n/a	n/a
P17	liq	LIQUIDS 1	2	n/a	n/a	n/a	121.1 250.0	30	n/a	n/a	n/a
P18	liq	LIQUIDS 1	2	n/a	n/a	n/a	121.1 250.0	30	n/a	n/a	n/a
P19	lkt	LEAKTEST	2	3	30	9.75/4.75	131.0 268.0	3	vac	4.75	n/a

** Dual values represent: first P(-pul) / subsequent P(-pu

FACTORY RAMP RATE SETTINGS

Cycle Phase			Ramp Rate	
No.	Description	SV No.	(PSI/Min.)	Comments
PH1200	Conditioning (Pos	1SV	50.00	Supervisor adjustabl
PH1200	Conditioning (Neg	2SV	50.00	Supervisor adjustabl
PH1800	Heat Up	1SV,14SV	*varying*	Supervisor adjustabl
PH1890	Liquid Heat Up	1SV,14SV	*varying*	non-adjustabl
PH3100	Exhaust	2SV	50.00	Supervisor adj. (same as neg pulse rat
PH3190	Liquid Exhaust	14SV	0.75	Supervisor adjustabl
PH3800	Air-In	3SV	50.00	Supervisor adj. (same as pos pulse rat

NOTES:

1) Refer to the corresponding Instrumentation Diagram (referenced in th unit's piping package) for piping schematics and hardware reference

2) Pressure vs. Time cycle phase diagrams are not to scal

3) Drain Cooling is software controlled via DO05 Water to Eject

4) Factory Setting for Liquid Dwell Time = 0 minute

5) 1SV, 2SV & 14SV in some phases are controlled with a fixed limit ram rate of 50.00 PSI/min (see Factory Ramp Rate Settings Table). Norma during these phases, the SV's energize fully and are indicated as suc in the phase diagrams and the Cycle Phase Description

6) Additional outputs applicable to units with steam generator
   a) "Boiler ON" (DO06) turns ON the steam generator while control are ON (except during auto blowdown or utility shut-off conditio
   b) "Boiler Blowdown" (DO15) turns ON during an auto blowdown eve

7) Additional outputs applicable to unidirectional double door uni
   a) "RE Door Seal" (DO16) is controlled as the "CE Door Seal" (DO1 during cycle.
   b) "RE Door Unseal" (DO17) is controlled as the "CE Door Unsea (DO11) during cycle.

LEGEND (for Cycle Phase Diagrams)

X	Energized
☐	De-energized
C	Controlled (typically by a set poin
R	Ramp Rate Controlle
S	Energized per selection (e.g. Gravity Dry vs. Vac Dr
D	Energized per door statu
SV	Solenoid Valv
DO	Digital Output (Software reference

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FIGURE 6–4, SHEET 4. PROCESS DIAGRAM, 633LS

Doc. Name: Process Diagram, 633LS Doc. No.: PP0027 Rev.: A

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Approved By:	ATR	12/14/07	Doc. File Name:	PP0027 Rev A Page 4-5.doc	Latest ECO:	122555
Approved By:			Doc. File Type:	MS Word 2003	Page:	4 of 5

Cycle Phase Descriptions:

PH0000 – STANDBY: Jacket temperature control is enabled. Jacket RTD maintains temperature by energizing and de-energizing 8SV. 8SV maintains steam to jacket throughout the cycle unless noted in the phase description. Also throughout the cycle, drain temperature is software controlled. 6SV (water to ejector) is energized when the drain temperature is greater than 60°C (or 140°F, service adjustable parameter) and de-energizes when the drain temperature falls below 55°C (the 5°C difference is a service adjustable parameter).

PH0500 – CYCLE START: Cycle Start button is pressed, door(s) seals per PH0110/PH0130 described below. Once jacket temperature is within +4.4 / -2.2°C (+8.0 / -4°F) of T(exp), the phase is complete.

PH01100 – PURGE: 1SV & 2SV energize. Steam enters the chamber through 1SV and purges chamber of air through 2SV. 6SV energizes if chamber pressure exceeds 2 PSI above atmosphere and de-energizes if pressure falls 1 PSI below atmosphere. Cooling water from 6SV condenses steam at ejector and flows to drain. After the purge time, 1SV, 2SV & 6SV de-energize and the phase is complete. Note: 51” model has a purge time of 00:02:30 (hh:mm:ss). 26” model purge times are as follows: vac cycles have 00:01:30 and non-vac cycles have 00:02:30.

PH1200 – CONDITIONING: Note: This phase may be repeated based on the quantity of pulses programmed.

- Steam pressurizes chamber through energized 1SV. When the chamber pressure is above 30.00 psia or is greater than the exposure set point – 5.2°C, as a pressure, 6SV turns on for the remainder of the positive pulse. When chamber pressure reaches:
  - If the adjustable parameter, PP 0=auto 1=man, is 0: P(+pul) (T(exp) – 2.2°C (or 4.0^{O}F)) converted to steam pressure , but no greater than 32.0 PSIA)…
  - If the adjustable parameter, PP 0=auto 1=man, is 1: P(+pul) (the value of the adjustable parameter, PosPul(PP) – man) , but no greater than 32.0 PSIA)…
- ...1SV de-energizes and 2SV & 6SV energize. Chamber steam is exhausted to ejector, condensed and drained.
- **For Gravity Cycle:** When chamber pressure reaches 0.5 PSI above atmosphere, 2SV & 6SV de-energizes and the phase is complete.
- **For PreVac Cycle w/ ejector only – Negative Pulse 1:** When chamber pressure reaches P(-pul), 2SV & 6SV de-energize and the phase is complete.
- **For PreVac Cycle w/ ejector only – Negative Pulse 2 (& subsequent pulses):** When chamber pressure reaches P(-pul), 2SV & 6SV de-energizes and the phase is complete.
- **For Leak Test w/ ejector:** When chamber pressure reaches 4.75 PSIA, 2SV & 6SV de-energizes and the phase is complete.
- **For PreVac w/ vacuum pump or water saver:**
  - **PreVac w/ vacuum pump:** When chamber pressure reaches 2.0 PSI below atmosphere, 2SV & 6SV de-energizes. 17SV, 18SV and the vacuum pump motor energize until P(-pul) is reached and the phase is complete. Note: 19SV is a normally open type solenoid valve and will energize/de-energize opposite of 18SV.
  - **PreVac w/ water saver:** When chamber pressure reaches 5.0 PSI below atmosphere, 2SV & 6SV de-energizes. 15SV energizes until P(-pul) is reached and the phase is complete.
- **For Leak Cycle w/ vacuum pump or water saver:**
  - **For Leak Cycle w/ vacuum pump:** When chamber pressure reaches 2.0 PSI below atmosphere, 2SV & 6SV de-energizes. 17SV, 18SV and the vacuum pump motor energize until 4.75 PSIA is reached and the phase is complete. Note: 19SV is a normally open type solenoid valve and will energize/de-energize opposite of 18SV.
  - **Leak Cycle w/ water saver:** When chamber pressure reaches 5.0 PSI below atmosphere, 2SV & 6SV de-energizes. 15SV energizes until 4.75 PSIA is reached and the phase is complete.

PH1800 – HEAT-UP: 1SV energizes and steam pressurizes the chamber. As the chamber temperature approaches the programmed exposure temperature, 1SV & 14SV are controlled (via chamber RTD) to slow down the ascent. When the programmed exposure temperature +0.4°C (0.7°F) is reached (sensed by the chamber RTD), the phase is then complete. 14SV control is as follows:

- **26” model:**
  - **Vacuum cycles:** When the chamber pressure is greater than atm + 1.0, 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (2 sec on, 3 sec off) for the remainder of the phase.
  - **Gravity cycles:** 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (3 sec on, 2 sec off) for the remainder of the phase.
- **39” & 51” models:**
  - **Vacuum cycles:** When the chamber pressure is greater than atm + 1.0, 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (2 sec on, 3 sec off) for the remainder of the phase.
  - **Gravity cycles:** 14SV mimics 1SV until the chamber temp is greater than the exposure setpoint + 0.2°C. 14SV is time-controlled (3 sec on, 2 sec off) for the remainder of the phase.

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FIGURE 6–4, SHEET 5. PROCESS DIAGRAM, 633LS

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Approved By: ATR 12/14/07 Doc. File Name: PP0027 Rev A Page 4-5.doc Latest ECO: 122555
Approved By: Doc. File Type: MS Word 2003 Page: 5 of 5

PH1890 – LIQUID HEAT-UP: 1SV energizes and steam pressurizes the chamber. 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase. As the chamber temperature approaches the programmed exposure temperature, 1SV is controlled (via chamber RTD) to slow down the ascent. When the programmed exposure temperature is reached (sensed by the chamber RTD), the phase is then complete. Note: For cycles utilizing the Liquid RTD, the exposure temperature in this phase is sensed by the Liquid RTD and by the chamber RTD, otherwise it is sensed only by the chamber RTD

PH1990 – LIQUID DWELL: (Note: This phase is skipped if the Liquid RTD is utilized). 1SV is controlled to maintain the selected exposure temperature & 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase. After a programmed time period, the phase is complete.

PH2000 – EXPOSURE: The programmed exposure timing begins. 1SV is controlled by the chamber RTD to maintain the selected exposure temperature. After the programmed exposure time expires, 1SV & 14SV de-energizes and the phase is complete. 14SV control is as follows:

- **26” and 51” models:** 14SV mimics 1SV for the entire phase.
- **39” model:** 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase.

PH2090 – LIQUID EXPOSURE: The programmed exposure timing begins. 1SV is controlled by the chamber RTD to maintain the selected exposure temperature. For cycles utilizing the liquid RTD, the load temperature is monitored by the liquid RTD to assure proper temperature control. For cycles utilizing an Fo setpoint, the Fo value is computed using the liquid RTD. 14SV is time-controlled (2 sec on, 3 sec off) for the entire phase. After the programmed exposure time expires or the Fo value is reached, 1SV & 14SV de-energizes and the phase is complete.

PH3100 – EXHAUST: 2SV & 6SV energize. Chamber steam is exhausted to ejector, condensed and drained.

- **For Gravity Drying:** When chamber pressure reaches atmosphere, 2SV, 6SV, & 14SV de-energize and the phase is complete.
- **For Vacuum Drying w/ejector only :** When chamber pressure reaches P(dry), 2SV, 6SV, & 14SV de-energize and the phase is complete.
- **For Leak Cycle w/ ejector only:** When chamber pressure reaches 4.75 PSIA, 2SV, 6SV, & 14SV de-energize and the phase is complete.
- **For Vacuum Drying w/ vacuum pump:** When chamber pressure reaches 2.0 PSI below atmosphere, 2SV & 6SV de-energize. 17SV, 18SV and the vacuum pump motor energize until P(dry) is reached and the phase is complete. Note: 19SV is a normally open type solenoid valve and will energize/de-energize opposite of 18SV.
- **For Leak Test Cycle w/ vacuum pump:** When chamber pressure reaches 2.0 PSI below atmosphere, 2SV & 6SV de-energize. 17SV, 18SV and the vacuum pump motor energize until 4.75 PSIA is reached and the phase is complete. Note: 19SV is a normally open type solenoid valve and will energize/de-energize opposite of 18SV.
- **For Vacuum Drying w/ water saver:** When chamber pressure reaches 5.0 PSI below atmosphere, 2SV & 6SV de-energize. 15SV energizes until P(dry) is reached and the phase is complete.
- **For Leak Test Cycle w/ water saver:** When chamber pressure reaches 5.0 PSI below atmosphere, 2SV & 6SV de-energize. 15SV energizes until 4.75 PSIA is reached and the phase is complete.

PH3190 – LIQUID EXHAUST: 8SV de-energizes and 1SV energizes (this clears steam from the jacket). Chamber pressure is decreased at a programmed ramp rate by energizing and de-energizing 14SV. When chamber pressure reaches 6 PSI above atmosphere, 6SV energizes. When the chamber temp reaches 100.0°C / 212.0°F, the chamber pressure is decreased at half the programmed ramp rate. When chamber pressure (sensed by the chamber pressure transducer) cools to <= Atm – 3.5 psia, the phase is complete. Note: For cycles utilizing the Liquid RTD, liquid load temperature (sensed by the Liquid RTD) must cool to 95°C (203.0°F) and the chamber pressure is below Atm, the phase is complete.

PH3110 – DRYING: The programmed dry timing begins. For unit with ejector only, 2SV & 6SV energize. For unit with a water saver, 15SV energizes. If Gravity Drying was selected, 3SV also energizes. When the time period elapses, 2SV, 3SV, 6SV & 15SV de-energize and the phase is complete. Note: For Leak Test cycle, the time in this phase is fixed at 15 minutes.

PH3700 – EQUALIZATION: All SV’s, except for door and jacket control, are de-energized. After a dwell period of 5 minutes, the phase is complete.

PH3710 – LEAK TEST: All SV’s, except for door and jacket control, are de-energized. Chamber pressure is initially checked. After 15 minutes, chamber pressure is checked again to determine leak rate and the phase is complete.

PH3800 – AIR-IN: 3SV energizes and, for Liquid cycles, 8SV remains de-energized. When chamber pressure is within 2 PSI of atmosphere, 3SV de-energizes and the phase is complete. Next, the controls proceed to either CE Unsealing or Doors Unsealing, depending on the door configuration.

PH4000 – CYCLE COMPLETE: 2SV & 3SV energize and, for Liquid cycles, 8SV remains de-energizes. The cycle complete buzzer sounds for 1 minute or until clear button is pressed. If unit has a single door or standard double door, the door(s) automatically unsealed. If unit has unidirectional double doors, both doors will remain sealed. When either door is opened, the buzzer will turn OFF (if not already OFF) and the phase is complete. Note: 2SV & 3SV de-energizes when door is unsealed (sensed by DI02 and/or DI06).

SEALING DOOR(S): **PH110 – CE SEALING (Single door or unidirectional double door units):** 10SV energizes and 12SV de-energizes. Gasket groove is pressurized, sealing the chamber.

PH120 – RE SEALING (Unidirectional double door units only): 11SV energizes and 13SV de-energizes. Gasket groove is pressurized, sealing the chamber.

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Doc. Name: Process Diagram, 633LS Doc. No.: PP0027 Rev.: A

Created By: ATR 12/14/07 Product: 633LS Class Code: 8104
Approved By: ATR 12/14/07 Doc. File Name: PP0027 Rev A Page 4-5.doc Latest ECO: 122555
Approved By: Doc. File Type: MS Word 2003 Page: 6 of 5

PH130 – DOORS SEALING (Standard double door units): 10SV energizes and 12SV de-energizes. Gasket groove is pressurized, sealing the chamber.

UNSEALING DOOR(S): **PH111 – CE UNSEALING (Single door or unidirectional double door units):** 10SV remains energized. 12SV & 6SV energize. After 4 seconds, 10SV de-energizes. Water to the ejector creates a vacuum in the gasket groove retracting the door gasket. After 30 seconds, 6SV de-energizes and the phase is complete.

PH121 – RE UNSEALING (Unidirectional double door units only): 11SV remains energized. 13SV & 6SV energize. After 4 seconds, 11SV de-energizes. Water to the ejector creates a vacuum in the gasket groove retracting the door gasket. After 30 seconds, 6SV de-energizes and the phase is complete.

PH131 – DOORS UNSEALING (Standard double door units): 10SV remains energized. 12SV & 6SV energize. After 4 seconds, 10SV de-energizes. Water to the ejector creates a vacuum in the gasket groove retracting the door gasket. After 30 seconds, 6SV de-energizes and the phase is complete.

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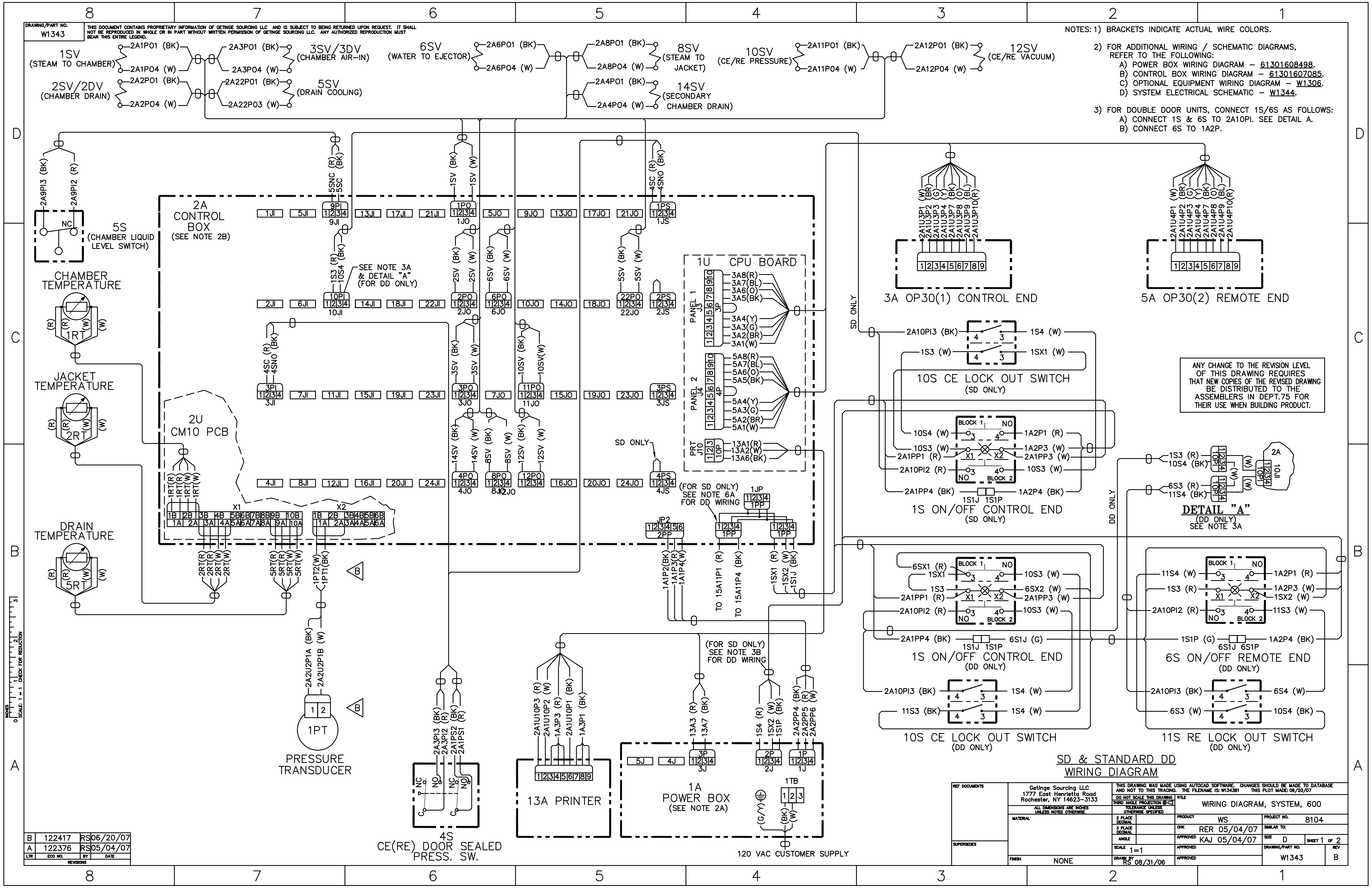
FIGURE 6–5, SHEET 1. SYSTEM WIRING DIAGRAM


DRAWING/PART NO. W1343
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NOTES: 1) BRACKETS INDICATE ACTUAL WIRE COLORS.
2) FOR ADDITIONAL WIRING / SCHEMATIC DIAGRAMS, REFER TO THE FOLLOWING:
A) POWER BOX WIRING DIAGRAM – 61301608498.
B) CONTROL BOX WIRING DIAGRAM – 61301607085.
C) OPTIONAL EQUIPMENT WIRING DIAGRAM – W1306.
D) SYSTEM ELECTRICAL SCHEMATIC – W1344.
3) FOR DOUBLE DOOR UNITS, CONNECT 1S/6S AS FOLLOWS:
A) CONNECT 1S & 6S TO 2A10PI. SEE DETAIL A.
B) CONNECT 6S TO 1A2P.
1SV (STEAM TO CHAMBER)
2SV/2DV (CHAMBER DRAIN)
3SV/3DV (CHAMBER AIR-IN)
5SV (DRAIN COOLING)
6SV (WATER TO EJECTOR)
8SV (STEAM TO JACKET)
14SV (SECONDARY CHAMBER DRAIN)
10SV (CE/RE PRESSURE)
12SV (CE/RE VACUUM)
5S (CHAMBER LIQUID LEVEL SWITCH)
CHAMBER TEMPERATURE 1RT
JACKET TEMPERATURE 2RT
DRAIN TEMPERATURE 5RT
2A CONTROL BOX (SEE NOTE 2B)
2U CM10 PCB
1U CPU BOARD
PANEL 1 J3 3P
PANEL 2 J4 4P
PRT J10 10P
SEE NOTE 3A & DETAIL "A" (FOR DD ONLY)
(FOR SD ONLY) SEE NOTE 6A FOR DD WIRING
SD ONLY
DD ONLY
3A OP30(1) CONTROL END
5A OP30(2) REMOTE END
10S CE LOCK OUT SWITCH (SD ONLY)
1S ON/OFF CONTROL END (SD ONLY)
DETAIL "A" (DD ONLY) SEE NOTE 3A
ANY CHANGE TO THE REVISION LEVEL OF THIS DRAWING REQUIRES THAT NEW COPIES OF THE REVISED DRAWING BE DISTRIBUTED TO THE ASSEMBLERS IN DEPT.75 FOR THEIR USE WHEN BUILDING PRODUCT.
1S ON/OFF CONTROL END (DD ONLY)
6S ON/OFF REMOTE END (DD ONLY)
10S CE LOCK OUT SWITCH (DD ONLY)
11S RE LOCK OUT SWITCH (DD ONLY)
1PT PRESSURE TRANSDUCER
4S CE(RE) DOOR SEALED PRESS. SW.
13A PRINTER
1A POWER BOX (SEE NOTE 2A)
(FOR SD ONLY) SEE NOTE 3B FOR DD WIRING
120 VAC CUSTOMER SUPPLY
SD & STANDARD DD WIRING DIAGRAM
INCHES 0 1 2 3 SCALE: 1 = 1 CHECK FOR REDUCTION
B 122417 RS 06/20/07
A 122376 RS 05/04/07
LTR ECO NO. BY DATE REVISIONS
Getinge Sourcing LLC 1777 East Henrietta Road Rochester, NY 14623–3133
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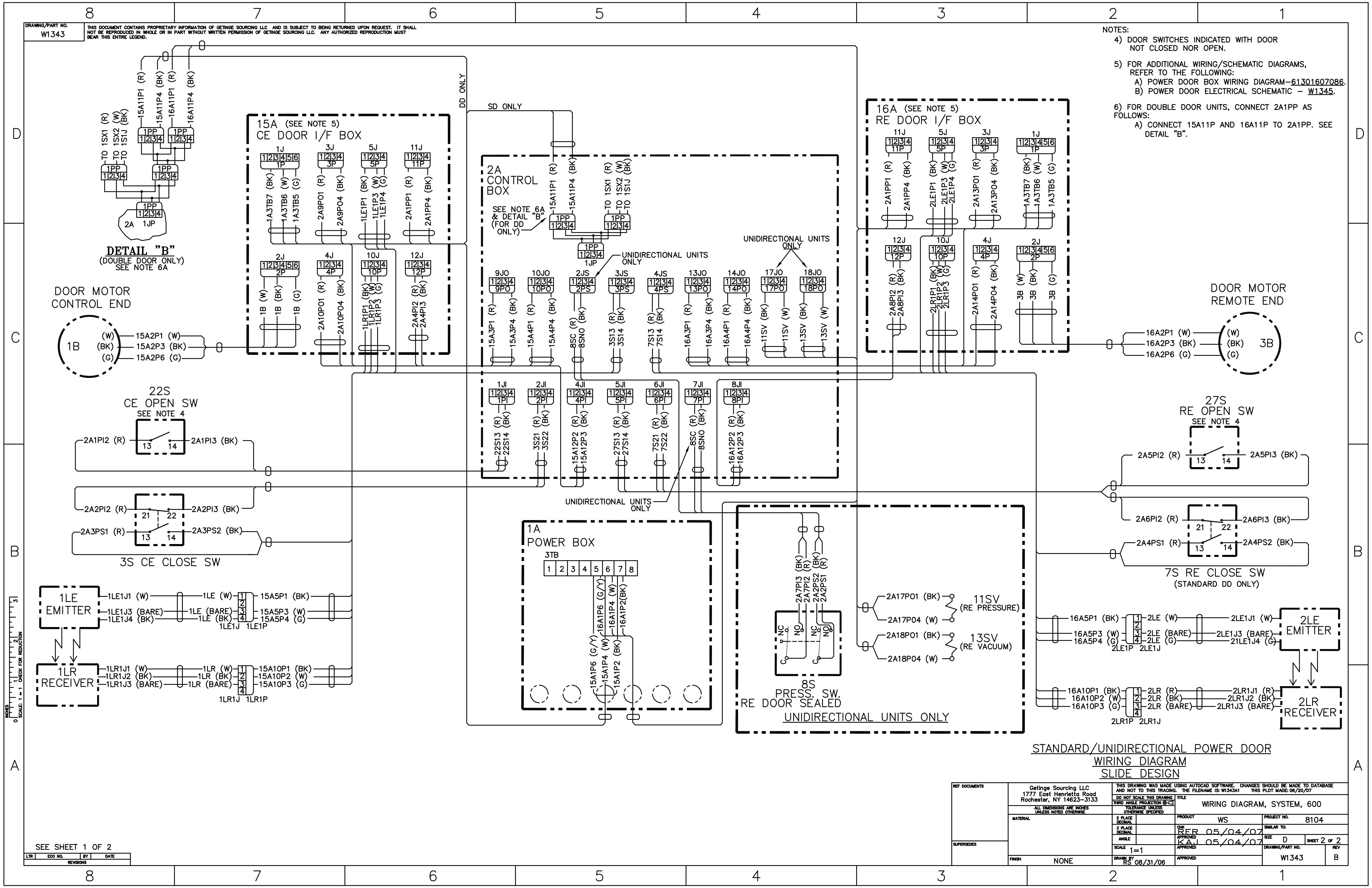
TITLE WIRING DIAGRAM, SYSTEM, 600
PRODUCT WS PROJECT NO. 8104
CHK RER 05/04/07
APPROVED KAJ 05/04/07
SIZE D SHEET 1 OF 2
SCALE 1=1
DRAWING/PART NO. W1343 REV B
FINISH NONE
DRAWN BY RS 08/31/06

FIGURE 6–5, SHEET 2. SYSTEM WIRING DIAGRAM


8
7
6
5
4
3
2
1
D
C
B
A
DRAWING/PART NO.
W1343
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TO 1SX1 (R)
TO 1SX2 (W)
TO 1S1J (BK)
15A11P1 (R)
15A11P4 (BK)
16A11P1 (R)
16A11P4 (BK)
1PP
2A 1JP
DETAIL "B"
(DOUBLE DOOR ONLY)
SEE NOTE 6A
15A (SEE NOTE 5)
CE DOOR I/F BOX
1J
1P
3J
3P
5J
5P
11J
11P
1A3TB7 (BK)
1A3TB6 (W)
1A3TB5 (G)
2A9PO1 (R)
2A9PO4 (BK)
1LE1P1 (BK)
1LE1P3 (W)
1LE1P4 (G)
2A1PP1 (R)
2A1PP4 (BK)
2J
2P
4J
4P
10J
10P
12J
12P
1B (W)
1B (BK)
1B (G)
2A10PO1 (R)
2A10PO4 (BK)
1LR1P1 (BK)
1LR1P2 (W)
1LR1P3 (G)
2A4PI2 (R)
2A4PI3 (BK)
DD ONLY
SD ONLY
2A
CONTROL
BOX
SEE NOTE 6A
& DETAIL "B"
(FOR DD
ONLY)
1JP
UNIDIRECTIONAL UNITS
ONLY
9JO
9PO
10JO
10PO
2JS
2PS
3JS
3PS
4JS
4PS
13JO
13PO
14JO
14PO
17JO
17PO
18JO
18PO
15A3P1 (R)
15A3P4 (BK)
15A4P1 (R)
15A4P4 (BK)
8SC (R)
8SNO (BK)
3S13 (R)
3S14 (BK)
7S13 (R)
7S14 (BK)
16A3P1 (R)
16A3P4 (BK)
16A4P1 (R)
16A4P4 (BK)
11SV (BK)
11SV (W)
13SV (BK)
13SV (W)
1JI
1PI
2JI
2PI
4JI
4PI
5JI
5PI
6JI
6PI
7JI
7PI
8JI
8PI
22S13 (R)
22S14 (BK)
3S21 (R)
3S22 (BK)
15A12P2 (R)
15A12P3 (BK)
27S13 (R)
27S14 (BK)
7S21 (R)
7S22 (BK)
8SC (R)
8SNO (BK)
16A12P2 (R)
16A12P3 (BK)
16A (SEE NOTE 5)
RE DOOR I/F BOX
2A1PP1 (R)
2A1PP4 (BK)
2LE1P1 (BK)
2LE1P3 (W)
2LE1P4 (G)
2A13PO1 (R)
2A13PO4 (BK)
1A3TB7 (BK)
1A3TB6 (W)
1A3TB5 (G)
2A8PI2 (R)
2A8PI3 (BK)
2LR1P1 (BK)
2LR1P2 (W)
2LR1P3 (G)
2A14PO1 (R)
2A14PO4 (BK)
3B (W)
3B (BK)
3B (G)
DOOR MOTOR
CONTROL END
1B
15A2P1 (W)
15A2P3 (BK)
15A2P6 (G)
DOOR MOTOR
REMOTE END
3B
16A2P1 (W)
16A2P3 (BK)
16A2P6 (G)
22S
CE OPEN SW
SEE NOTE 4
2A1PI2 (R)
2A1PI3 (BK)
13
14
2A2PI2 (R)
2A2PI3 (BK)
2A3PS1 (R)
2A3PS2 (BK)
21
22
3S CE CLOSE SW
27S
RE OPEN SW
SEE NOTE 4
2A5PI2 (R)
2A5PI3 (BK)
2A6PI2 (R)
2A6PI3 (BK)
2A4PS1 (R)
2A4PS2 (BK)
7S RE CLOSE SW
(STANDARD DD ONLY)
UNIDIRECTIONAL UNITS
ONLY
1A
POWER BOX
3TB
16A1P6 (G/Y)
16A1P4 (W)
16A1P2 (BK)
15A1P6 (G/Y)
15A1P4 (W)
15A1P2 (BK)
2A7PI3 (BK)
2A7PI2 (R)
2A2PS2 (BK)
2A2PS1 (R)
NC
NO
8S
PRESS. SW.
RE DOOR SEALED
UNIDIRECTIONAL UNITS ONLY
2A17PO1 (BK)
2A17PO4 (W)
11SV
(RE PRESSURE)
2A18PO1 (BK)
2A18PO4 (W)
13SV
(RE VACUUM)
1LE
EMITTER
1LE1J1 (W)
1LE1J3 (BARE)
1LE1J4 (BK)
1LE (W)
1LE (BARE)
1LE (BK)
15A5P1 (BK)
15A5P3 (W)
15A5P4 (G)
1LE1J 1LE1P
1LR
RECEIVER
1LR1J1 (W)
1LR1J2 (BK)
1LR1J3 (BARE)
1LR (W)
1LR (BK)
1LR (BARE)
15A10P1 (BK)
15A10P2 (W)
15A10P3 (G)
1LR1J 1LR1P
16A5P1 (BK)
16A5P3 (W)
16A5P4 (G)
2LE (W)
2LE (BARE)
2LE (G)
2LE1J1 (W)
2LE1J3 (BARE)
2LE1J4 (G)
2LE1P 2LE1J
2LE
EMITTER
16A10P1 (BK)
16A10P2 (W)
16A10P3 (G)
2LR (R)
2LR (BK)
2LR (BARE)
2LR1J1 (R)
2LR1J2 (BK)
2LR1J3 (BARE)
2LR1P 2LR1J
2LR
RECEIVER
INCHES
SCALE: 1 = 1 CHECK FOR REDUCTION
SEE SHEET 1 OF 2
LTR
ECO NO.
BY
DATE
REVISIONS

NOTES:

4) DOOR SWITCHES INDICATED WITH DOOR NOT CLOSED NOR OPEN.

5) FOR ADDITIONAL WIRING/SCHEMATIC DIAGRAMS, REFER TO THE FOLLOWING:
A) POWER DOOR BOX WIRING DIAGRAM–61301607086.
B) POWER DOOR ELECTRICAL SCHEMATIC – W1345.

6) FOR DOUBLE DOOR UNITS, CONNECT 2A1PP AS FOLLOWS:
A) CONNECT 15A11P AND 16A11P TO 2A1PP. SEE DETAIL "B".

STANDARD/UNIDIRECTIONAL POWER DOOR
WIRING DIAGRAM
SLIDE DESIGN

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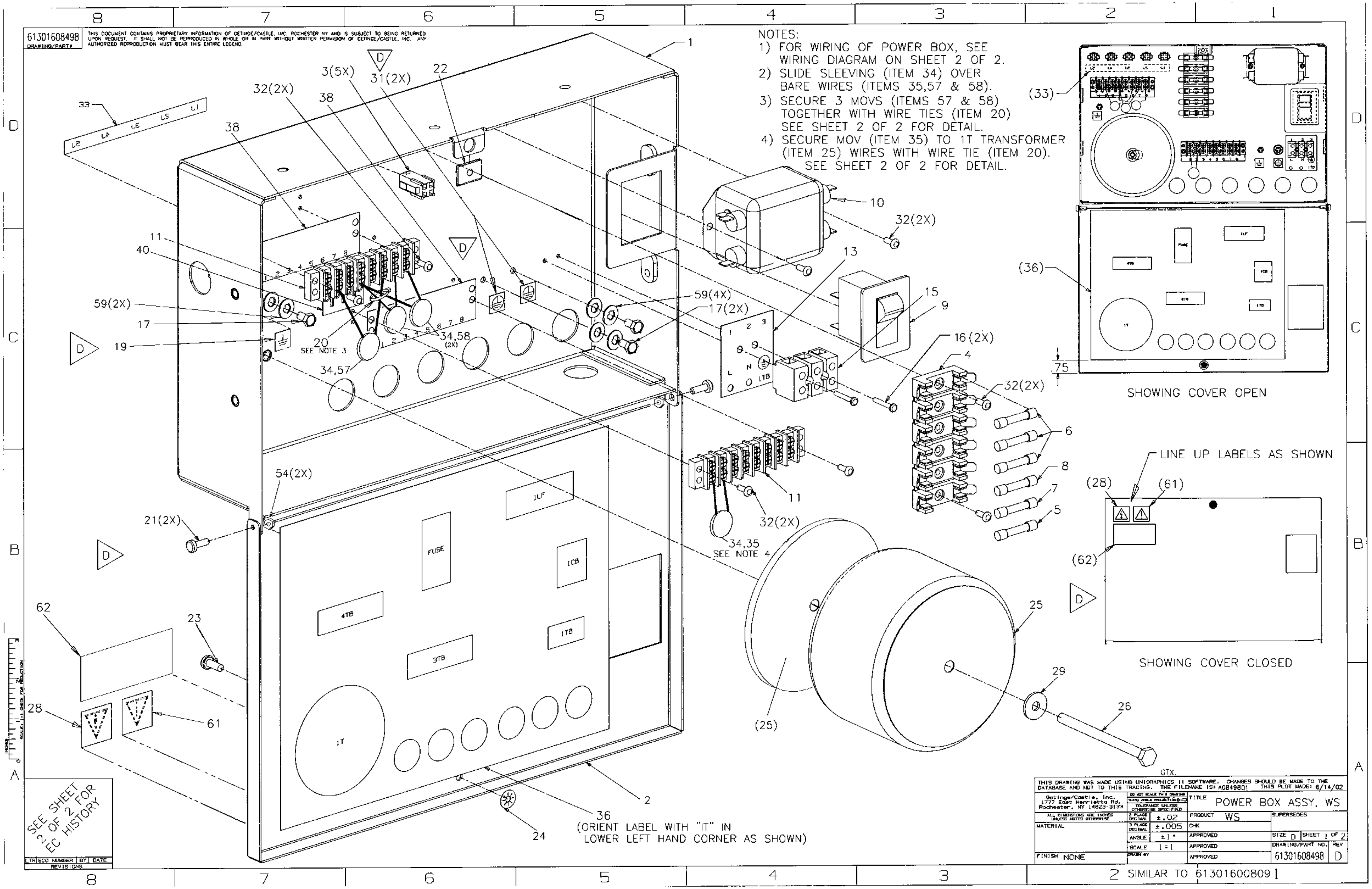
	ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE	DO NOT SCALE THIS DRAWING THIRD ANGLE PROJECTION TOLERANCE UNLESS OTHERWISE SPECIFIED	TITLE WIRING DIAGRAM, SYSTEM, 600		
	MATERIAL	2 PLACE DECIMAL	PRODUCT WS	PROJECT NO. 8104	
		3 PLACE DECIMAL	CHK REFR 05/04/07	SIMILAR TO:	
SUPERSEDES		ANGLE	APPROVED KAJ 05/04/07	SIZE D	SHEET 2 OF 2
		SCALE 1=1	APPROVED	DRAWING/PART NO. W1343	REV B
	FINISH NONE	DRAWN BY RS 08/31/06	APPROVED		

FIGURE 6–6, SHEET 1. POWER BOX 1A WIRING DIAGRAM



61301608498
DRAWING/PART#

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NOTES:
1) FOR WIRING OF POWER BOX, SEE WIRING DIAGRAM ON SHEET 2 OF 2.
2) SLIDE SLEEVING (ITEM 34) OVER BARE WIRES (ITEMS 35,57 & 58).
3) SECURE 3 MOVS (ITEMS 57 & 58) TOGETHER WITH WIRE TIES (ITEM 20) SEE SHEET 2 OF 2 FOR DETAIL.
4) SECURE MOV (ITEM 35) TO 1T TRANSFORMER (ITEM 25) WIRES WITH WIRE TIE (ITEM 20). SEE SHEET 2 OF 2 FOR DETAIL.

(ORIENT LABEL WITH "IT" IN LOWER LEFT HAND CORNER AS SHOWN)

LINE UP LABELS AS SHOWN

SHOWING COVER OPEN

SHOWING COVER CLOSED

SEE SHEET 2 OF 2 FOR EC HISTORY

LTR	ECO NUMBER	BY	DATE

REVISIONS

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THIRD ANGLE PROJECTION
TOLERANCE UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE
2 PLACE DECIMAL ±.02
3 PLACE DECIMAL ±.005
ANGLE ±1°
SCALE 1=1
DRAWN BY
MATERIAL
FINISH NONE
TITLE POWER BOX ASSY, WS
PRODUCT WS
CHK
APPROVED
APPROVED
APPROVED
SUPERSEDES
SIZE D
SHEET 1 OF 2
DRAWING/PART NO. 61301608498
REV D

SIMILAR TO 61301600809

8
7
6
5
4
3
2
1
D
C
B
A
D
33
L2
L4
LE
LS
L1
3(5X)
31(2X)
22
32(2X)
38
38
1
11
40
59(2X)
17
19
20
SEE NOTE 3
34,58
(2X)
34,57
59(4X)
17(2X)
10
32(2X)
13
15
9
16(2X)
4
32(2X)
6
8
7
5
11
32(2X)
34,35
SEE NOTE 4
54(2X)
21(2X)
1LF
FUSE
1CB
4TB
3TB
1TB
1T
62
23
28
61
25
(25)
29
26
36
2
24
(33)
(36)
.75
(28)
(61)
(62)
GTX.

FIGURE 6–6, SHEET 2. POWER BOX 1A WIRING DIAGRAM

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61301608498

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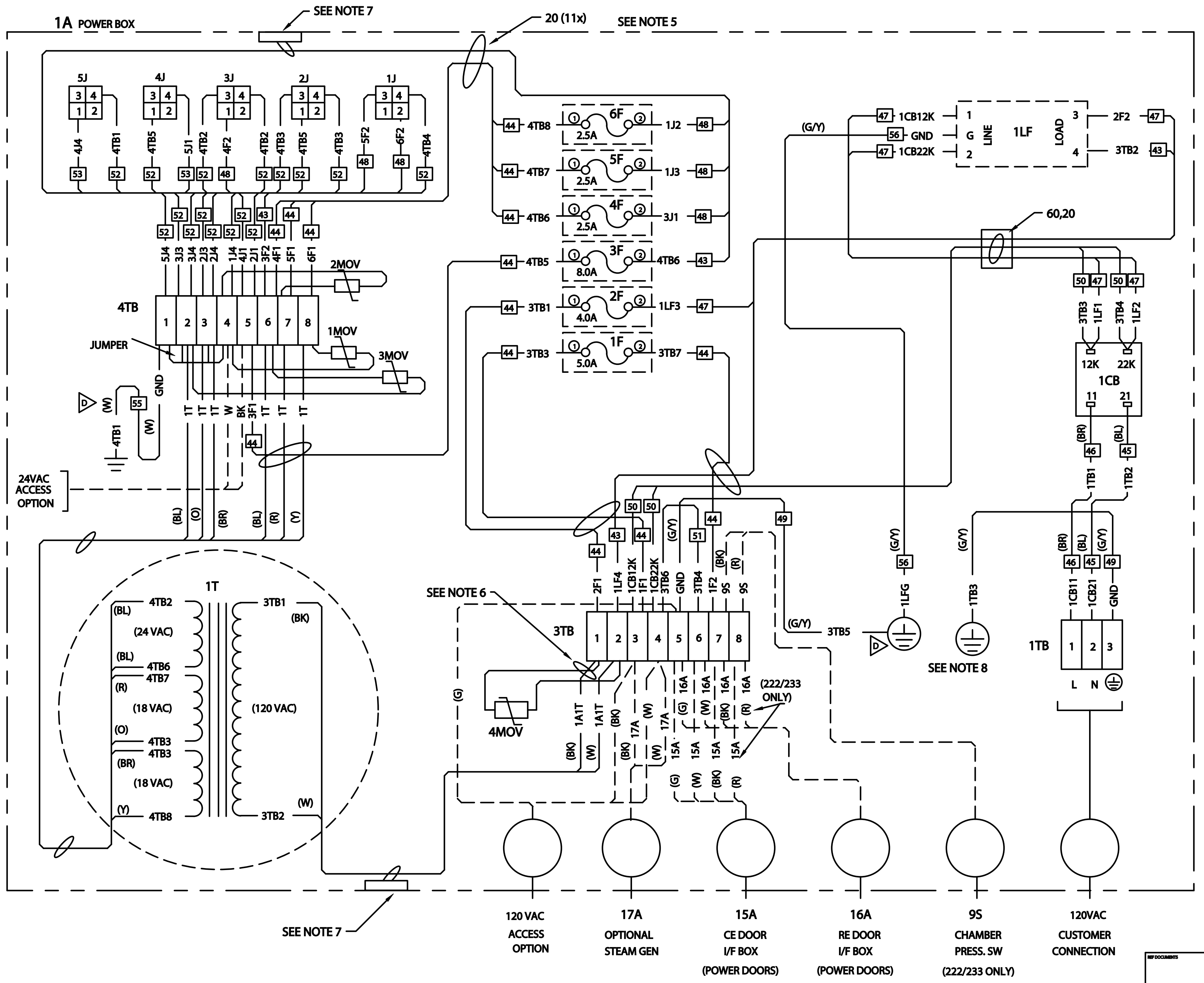
1A POWER BOX
SEE NOTE 7
20 (11x)
SEE NOTE 5
5J
4J
3J
2J
1J
3 4
1 2
4J4
4TB1
4TB5
5J1
4TB2
4F2
4TB2
4TB3
4TB5
4TB3
5F2
6F2
4TB4
53
52
48
43
44
5J4
3J3
3J4
2J3
2J4
1J4
4J1
2J1
3F2
4F1
5F1
6F1
2MOV
1MOV
3MOV
4TB
JUMPER
1 2 3 4 5 6 7 8
GND
(W)
55
4TB1
1T
W
BK
3F1
24VAC
ACCESS
OPTION
(BL)
(O)
(BR)
(R)
(Y)
4TB8
4TB7
4TB6
4TB5
3TB1
3TB3
6F
5F
4F
3F
2F
1F
2.5A
8.0A
4.0A
5.0A
1J2
1J3
3J1
4TB6
1LF3
3TB7
47
1CB12K
56
GND
1CB22K
LINE
1LF
LOAD
G
2F2
3TB2
(G/Y)
60,20
50
3TB3
1LF1
3TB4
1LF2
12K
22K
1CB
11
21
46
45
1TB1
1TB2
49
51
2F1
1LF4
1CB12K
1F1
1CB22K
3TB6
GND
3TB4
1F2
9S
3TB
3TB5
1LFG
1TB3
SEE NOTE 8
1CB11
1CB21
1TB
L N
SEE NOTE 6
4MOV
(G)
1A1T
17A
16A
15A
(222/233 ONLY)
4TB2
3TB1
(24 VAC)
4TB6
4TB7
(18 VAC)
(120 VAC)
4TB3
3TB2
4TB8
SEE NOTE 7
120 VAC
ACCESS
OPTION
17A
OPTIONAL
STEAM GEN
15A
CE DOOR
I/F BOX
(POWER DOORS)
16A
RE DOOR
I/F BOX
(POWER DOORS)
9S
CHAMBER
PRESS. SW
(222/233 ONLY)
120VAC
CUSTOMER
CONNECTION

NOTES:

1) BRACKETS () INDICATE ACTUAL WIRE COLOR. THESE WIRES WILL NOT NEED STAMPING.

2) CHANGES TO THIS DIAGRAM MUST ALSO BE MADE TO LABEL P/N 61301608500.

3) ITEM NUMBER OF WIRE IS INDICATED IN BOX ALONG WIRE RUN. THESE ITEM NUMBERS ARE NOT SHOWN ON LABEL P/N 61301608500.

4. ANY CHANGES TO THIS DRAWING MAY AFFECT ELECTRICAL SCHEMATIC W1304.

5. USE CABLE TIES (ITEM 20) AND CABLE TIE MOUNT (ITEM 60) WHERE INDICATED TO ENSURE PROPER SEPARATION OF LOW AND HIGH VOLTAGE WIRES.

6. ATTACH MOV (ITEM 35) TO THE PRIMARY WIRES OF THE TRANSFORMER VIA WIRE TIES (ITEM 20).

7. FASTEN CABLE TIE MOUNT TO SIDE WALL OF BOX IN THESE 2 LOCATIONS.

8. SANDWICH GROUND WIRE ASSEMBLY (ITEMS 49, 56) BETWEEN 2 STAR WASHERS.

LTR	ECO NO.	BY	DATE
D	120528	KMG	06/07/02
C	120460	RAS	2/8/02
B	120392	KG	11/30/01
A	120362	KG	10/03/01

REVISIONS

REF DOCUMENTS

SUPERSEDES

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1777 East Henrietta Road
Rochester, NY 14623-3133

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MATERIAL

FINISH NONE

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DO NOT SCALE THIS DRAWING

THIRD ANGLE PROJECTION

TOLERANCE UNLESS OTHERWISE SPECIFIED

2 PLACE DECIMAL	±.02
3 PLACE DECIMAL	±.005
ANGLE	±1°

SCALE NTS

DRAWN BY KG 10/03/01

TITLE POWER BOX ASSY,WS

PRODUCT WS

PROJECT NO. 8104

CHK

SIMILAR TO:

APPROVED

APPROVED

APPROVED

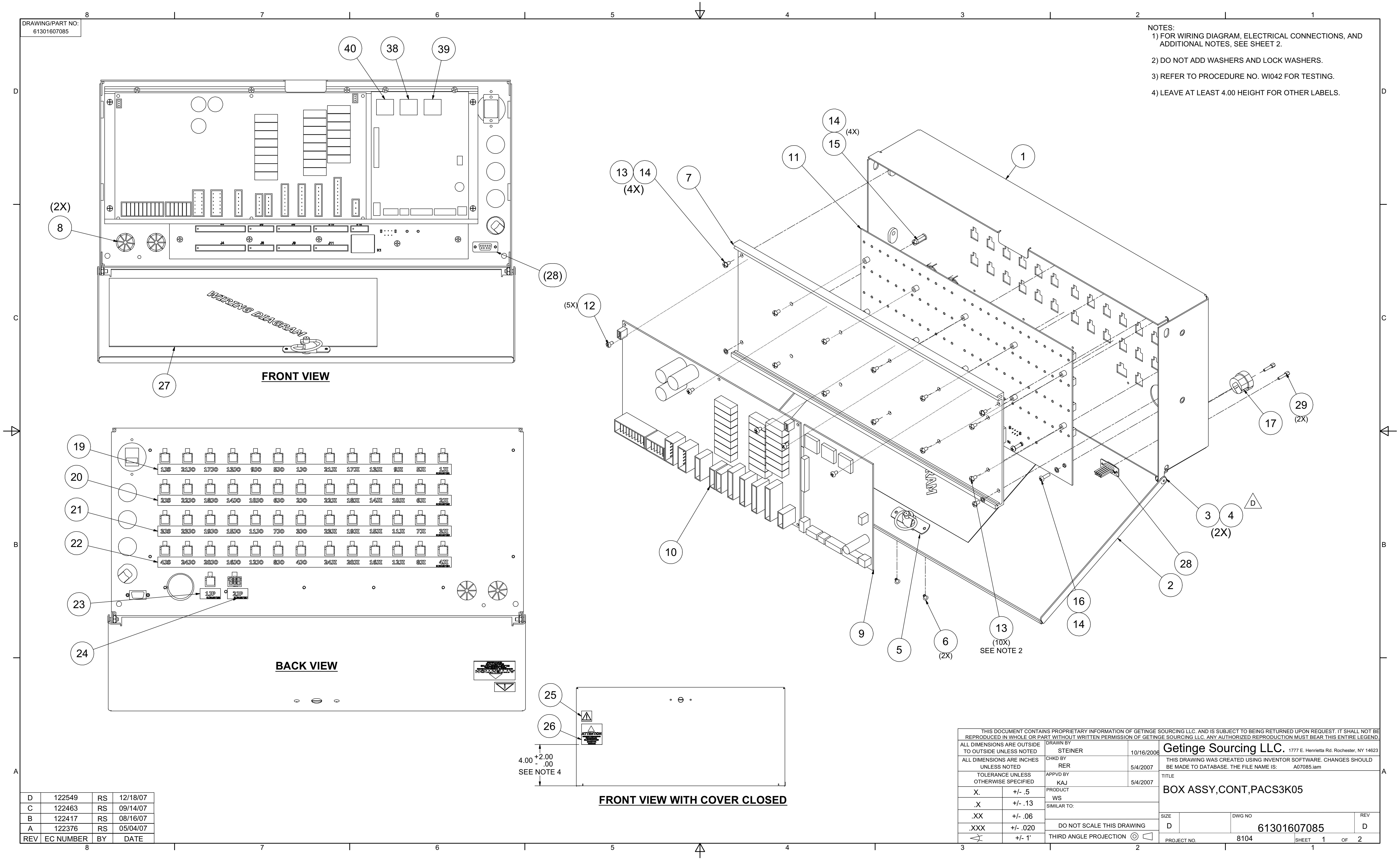
SIZE D

SHEET 2 OF 2

DRAWING/PART NO. 61301608498

REV D

FIGURE 6–7, SHEET 1. CONTROL BOX 2A WIRING DIAGRAM


DRAWING/PART NO:
61301607085
FRONT VIEW
BACK VIEW
FRONT VIEW WITH COVER CLOSED
WIRING DIAGRAM
1
2
3
4
(2X)
5
6
(2X)
7
8
(2X)
9
10
11
12
(5X)
13
14
(4X)
13
(10X)
SEE NOTE 2
14
15
(4X)
16
17
19
20
21
22
23
24
25
26
27
(28)
28
29
(2X)
38
39
40
4.00 +2.00 -.00
SEE NOTE 4
1UP
2UP
D

NOTES:
1) FOR WIRING DIAGRAM, ELECTRICAL CONNECTIONS, AND ADDITIONAL NOTES, SEE SHEET 2.
2) DO NOT ADD WASHERS AND LOCK WASHERS.
3) REFER TO PROCEDURE NO. WI042 FOR TESTING.
4) LEAVE AT LEAST 4.00 HEIGHT FOR OTHER LABELS.

REV	EC NUMBER	BY	DATE
D	122549	RS	12/18/07
C	122463	RS	09/14/07
B	122417	RS	08/16/07
A	122376	RS	05/04/07

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ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE UNLESS NOTED	DRAWN BY STEINER	10/16/2006	Getinge Sourcing LLC. 1777 E. Henrietta Rd. Rochester, NY 14623
ALL DIMENSIONS ARE INCHES UNLESS NOTED	CHKD BY RER	5/4/2007	THIS DRAWING WAS CREATED USING INVENTOR SOFTWARE. CHANGES SHOULD BE MADE TO DATABASE. THE FILE NAME IS: A07085.iam
TOLERANCE UNLESS OTHERWISE SPECIFIED	APPVD BY KAJ	5/4/2007	TITLE BOX ASSY,CONT,PACS3K05
X. +/- .5	PRODUCT WS		
.X +/- .13	SIMILAR TO:		
.XX +/- .06			SIZE D — DWG NO 61301607085 — REV D
.XXX +/- .020	DO NOT SCALE THIS DRAWING		
∠ +/- 1°	THIRD ANGLE PROJECTION		PROJECT NO. 8104 — SHEET 1 OF 2

FIGURE 6–7, SHEET 2. CONTROL BOX 2A WIRING DIAGRAM

DRAWING/PART NO. 61301607085

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NOTES: (SEE SHEET 1 FOR NOTES 1 THRU 4)

7) ENSURE THAT ALL SLIDE SWITCHES (SW1 THRU SW4) ARE IN CORRECT POSITION AS SHOWN.

8) ON 3U (I/O BOARD) JUMPER SHOULD BE ON JP12. OTHER JUMPERS SHOULD BE INSTALLED BY REFERRING TO CHART ON DRAWING AND DOOR CONFIGURATIONS.

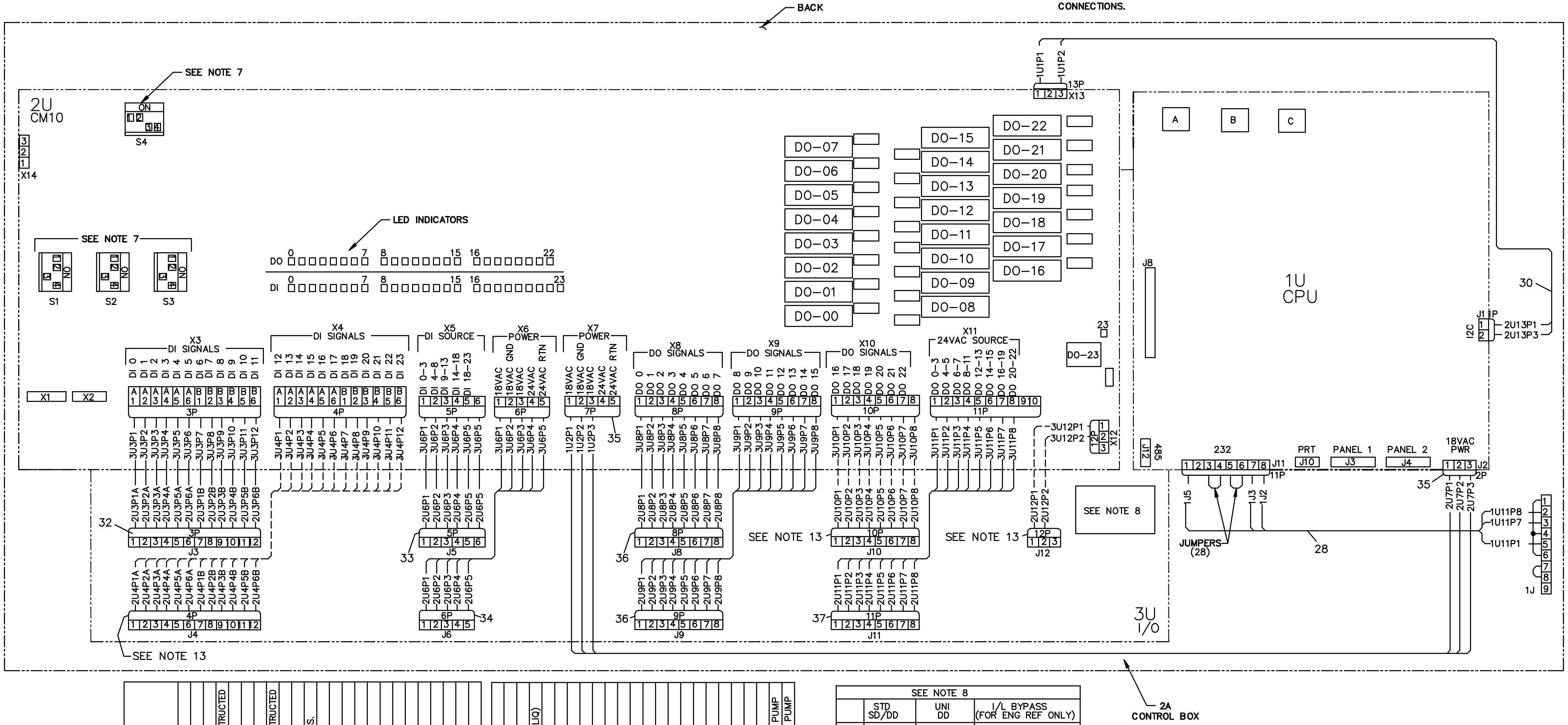
9) REMOVE POWER FROM UNIT BEFORE PLUGGING OR UNPLUGGING ANY ELECTRICAL CONNECTIONS.

10) USE ITEM 48(WIRE TIES) TO BUNDLE WIRES TOGETHER WHERE REQUIRED.

11) NOTE TO ENGINEERING: CHANGES TO THIS DRAWING MUST ALSO BE MADE TO LABEL TBD.

12) REFER TO DRAWING W1344 FOR OUTPUT SCHEMATIC DIAGRAM.

13) THESE HARNESSES ARE ONLY REQUIRED FOR UNI-DIRECTIONAL OR 544/744 UNITS.


BACK
SEE NOTE 7
2U
CM10
X14
ON
S4
SEE NOTE 7
S1
S2
S3
LED INDICATORS
DO 0 7 8 15 16 22
DI 0 7 8 15 16 23
X1
X2
X3
DI SIGNALS
3P
X4
DI SIGNALS
4P
X5
DI SOURCE
5P
X6
POWER
6P
X7
POWER
7P
X8
DO SIGNALS
8P
X9
DO SIGNALS
9P
X10
DO SIGNALS
10P
X11
24VAC SOURCE
11P
DO-00
DO-01
DO-02
DO-03
DO-04
DO-05
DO-06
DO-07
DO-08
DO-09
DO-10
DO-11
DO-12
DO-13
DO-14
DO-15
DO-16
DO-17
DO-18
DO-19
DO-20
DO-21
DO-22
DO-23
1U1P1
1U1P2
13P
X13
A
B
C
J8
1U
CPU
30
J1 1P
I2C
2U13P1
2U13P3
23
485
J12
3U12P1
3U12P2
12P
X12
232
J11
11P
PRT
J10
PANEL 1
J3
PANEL 2
J4
18VAC PWR
J2
2P
J5
J3
J2
35
SEE NOTE 8
JUMPERS (28)
28
2U7P1
2U7P2
2U7P3
1U11P8
1U11P7
1U11P1
1J
32
3P
J3
33
5P
J5
36
8P
J8
SEE NOTE 13
10P
J10
SEE NOTE 13
12P
J12
4P
J4
6P
J6
34
36
9P
J9
37
11P
J11
3U
I/O
SEE NOTE 13
2A
CONTROL BOX

FUNCTION	2A BOX JACK NO.	SOFTWARE REFERENCE
CE OPEN	1JI	DI 00
CE NOT CLOSED	2JI	DI 01
CE(/RE) SEALED	3JI	DI 02
CE FOOT SW/NOT OBSTRUCTED	4JI	DI 03
RE OPEN	5JI	DI 04
RE NOT CLOSED	6JI	DI 05
RE SEALED (SF)	7JI	DI 06
RE FOOT SW/NOT OBSTRUCTED	8JI	DI 07
H2O NOT IN DRAIN	9JI	DI 08
CONTROLS ON	10JI	DI 09
ADEQUATE AIR PRESS.	11JI	DI 10
	12JI	DI 11
	13JI	DI 12
	14JI	DI 13
	15JI	DI 14
	16JI	DI 15
	17JI	DI 16
	18JI	DI 17
	19JI	DI 18
	20JI	DI 19
	21JI	DI 20
	22JI	DI 21
	23JI	DI 22
	24JI	DI 23

INPUT IDENTIFICATION

FUNCTION	2A BOX JACK NO.	SOFTWARE REFERENCE
STM TO CHAMBER	1JO	DO 00
CHAMBER DRAIN	2JO	DO 01
CHAMBER AIR-IN	3JO	DO 02
SECONDARY DRAIN (LIQ)	4JO	DO 03
SECONDARY BUZZER	5JO	DO 04
WATER TO EJECTOR	6JO	DO 05
BOILER ON	7JO	DO 06
STEAM TO JACKET	8JO	DO 07
CE, OPEN	9JO	DO 08
CE, CLOSE	10JO	DO 09
CE(/RE), SEAL	11JO	DO 10
CE(/RE), UNSEAL	12JO	DO 11
RE, OPEN	13JO	DO 12
RE, CLOSE	14JO	DO 13
WATER SAVER	15JO	DO 14
BOILER B.D.	16JO	DO 15
RE SEAL (SF)	17JO	DO 16
RE UNSEAL (SF)	18JO	DO 17
EFFLUENT STEAM	19JO	DO 18
EFFLUENT DRAIN	20JO	DO 19
EFFLUENT FILTER	21JO	DO 20
WATER TO DRAIN	22JO	DO 21
MULTI BY/DRAIN TO PUMP	23JO	DO 22
SEC STEAM/H2O TO PUMP	24JO	DO 23

OUTPUT IDENTIFICATION

SEE NOTE 8

	STD SD/DD	UNI DD	I/L BYPASS (FOR ENG REF ONLY)
JP3	○━○	○ ○	○ ○
JP4	○━○	○ ○	○ ○
JP5	○ ○	○━○	○ ○
JP6	○ ○	○━○	○ ○
JP7	○ ○	○━○	○ ○
JP8	○ ○	○ ○	○—○ D000
JP9	○ ○	○ ○	○—○ D010
JP10	○ ○	○ ○	○—○ D016
JP11	○ ○	○ ○	○—○ D018

ALARM

	ENABLE	DISABLE
JP12	○━○	○ ○

SEE SHEET 1 OF 2

LTR	ECO NO.	BY	DATE

REVISIONS

INCHES 0 1 2 3 SCALE: 1 = 1 CHECK FOR REDUCTION

SHEET 1 OF 2 IS D-SIZE

REF DOCUMENTS

SUPERSEDES

Getinge Sourcing LLC
1777 East Henrietta Road
Rochester, NY 14623–3133

ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE

MATERIAL

FINISH NONE

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DO NOT SCALE THIS DRAWING

THIRD ANGLE PROJECTION

TOLERANCE UNLESS OTHERWISE SPECIFIED

2 PLACE DECIMAL

3 PLACE DECIMAL

ANGLE

SCALE 1=1

DRAWN BY

TITLE WIRING DIAGRAM, CONTROL BOX

PRODUCT PACS 3500

CHK RER 05/04/07

APPROVED KAJ 05/04/07

APPROVED

APPROVED

PROJECT NO. 8104

SIMILAR TO:

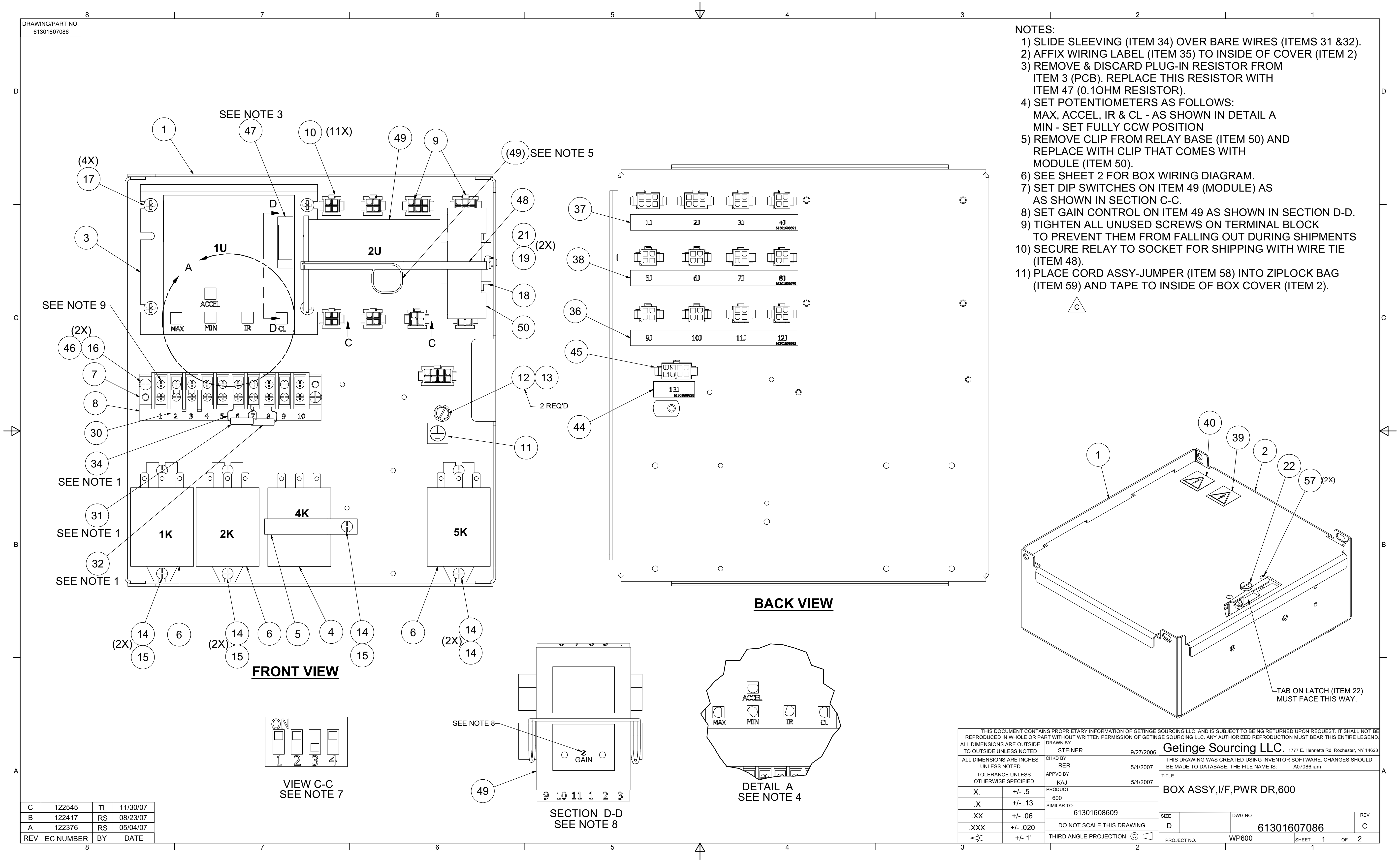
SIZE D

SHEET 2 OF 2

DRAWING/PART NO. 61301607085

REV D

FIGURE 6–8, SHEET 1. DOOR I/F BOX 15A/16A WIRING DIAGRAM


DRAWING/PART NO:
61301607086
8
7
6
5
4
3
2
1
D
C
B
A
SEE NOTE 3
1
47
10
(11X)
49
9
(49) SEE NOTE 5
(4X)
17
3
D
1U
A
2U
ACCEL
MAX
MIN
IR
CL
D
C
C
48
21
(2X)
19
18
50
SEE NOTE 9
(2X)
46
16
7
8
30
34
SEE NOTE 1
31
SEE NOTE 1
32
SEE NOTE 1
1 2 3 4 5 6 7 8 9 10
12
13
2 REQ'D
11
1K
2K
4K
5K
(2X)
14
15
6
14
(2X)
15
6
5
4
14
15
6
14
(2X)
14
FRONT VIEW
37
38
36
45
44
1J 2J 3J 4J
5J 6J 7J 8J
9J 10J 11J 12J
13J
BACK VIEW
40
39
1
2
22
57 (2X)
TAB ON LATCH (ITEM 22) MUST FACE THIS WAY.
ON
1 2 3 4
VIEW C-C
SEE NOTE 7
SEE NOTE 8
GAIN
49
9 10 11 1 2 3
SECTION D-D
SEE NOTE 8
ACCEL
MAX
MIN
IR
CL
DETAIL A
SEE NOTE 4

NOTES:
1) SLIDE SLEEVING (ITEM 34) OVER BARE WIRES (ITEMS 31 &32).
2) AFFIX WIRING LABEL (ITEM 35) TO INSIDE OF COVER (ITEM 2)
3) REMOVE & DISCARD PLUG-IN RESISTOR FROM ITEM 3 (PCB). REPLACE THIS RESISTOR WITH ITEM 47 (0.1OHM RESISTOR).
4) SET POTENTIOMETERS AS FOLLOWS:
MAX, ACCEL, IR & CL - AS SHOWN IN DETAIL A
MIN - SET FULLY CCW POSITION
5) REMOVE CLIP FROM RELAY BASE (ITEM 50) AND REPLACE WITH CLIP THAT COMES WITH MODULE (ITEM 50).
6) SEE SHEET 2 FOR BOX WIRING DIAGRAM.
7) SET DIP SWITCHES ON ITEM 49 (MODULE) AS AS SHOWN IN SECTION C-C.
8) SET GAIN CONTROL ON ITEM 49 AS SHOWN IN SECTION D-D.
9) TIGHTEN ALL UNUSED SCREWS ON TERMINAL BLOCK TO PREVENT THEM FROM FALLING OUT DURING SHIPMENTS
10) SECURE RELAY TO SOCKET FOR SHIPPING WITH WIRE TIE (ITEM 48).
11) PLACE CORD ASSY-JUMPER (ITEM 58) INTO ZIPLOCK BAG (ITEM 59) AND TAPE TO INSIDE OF BOX COVER (ITEM 2).
C

REV	EC NUMBER	BY	DATE
C	122545	TL	11/30/07
B	122417	RS	08/23/07
A	122376	RS	05/04/07

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ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE UNLESS NOTED
ALL DIMENSIONS ARE INCHES UNLESS NOTED
TOLERANCE UNLESS OTHERWISE SPECIFIED

X.	+/- .5
.X	+/- .13
.XX	+/- .06
.XXX	+/- .020
∢	+/- 1°

DRAWN BY STEINER 9/27/2006
CHKD BY RER 5/4/2007
APPVD BY KAJ 5/4/2007
PRODUCT 600
SIMILAR TO: 61301608609
DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION

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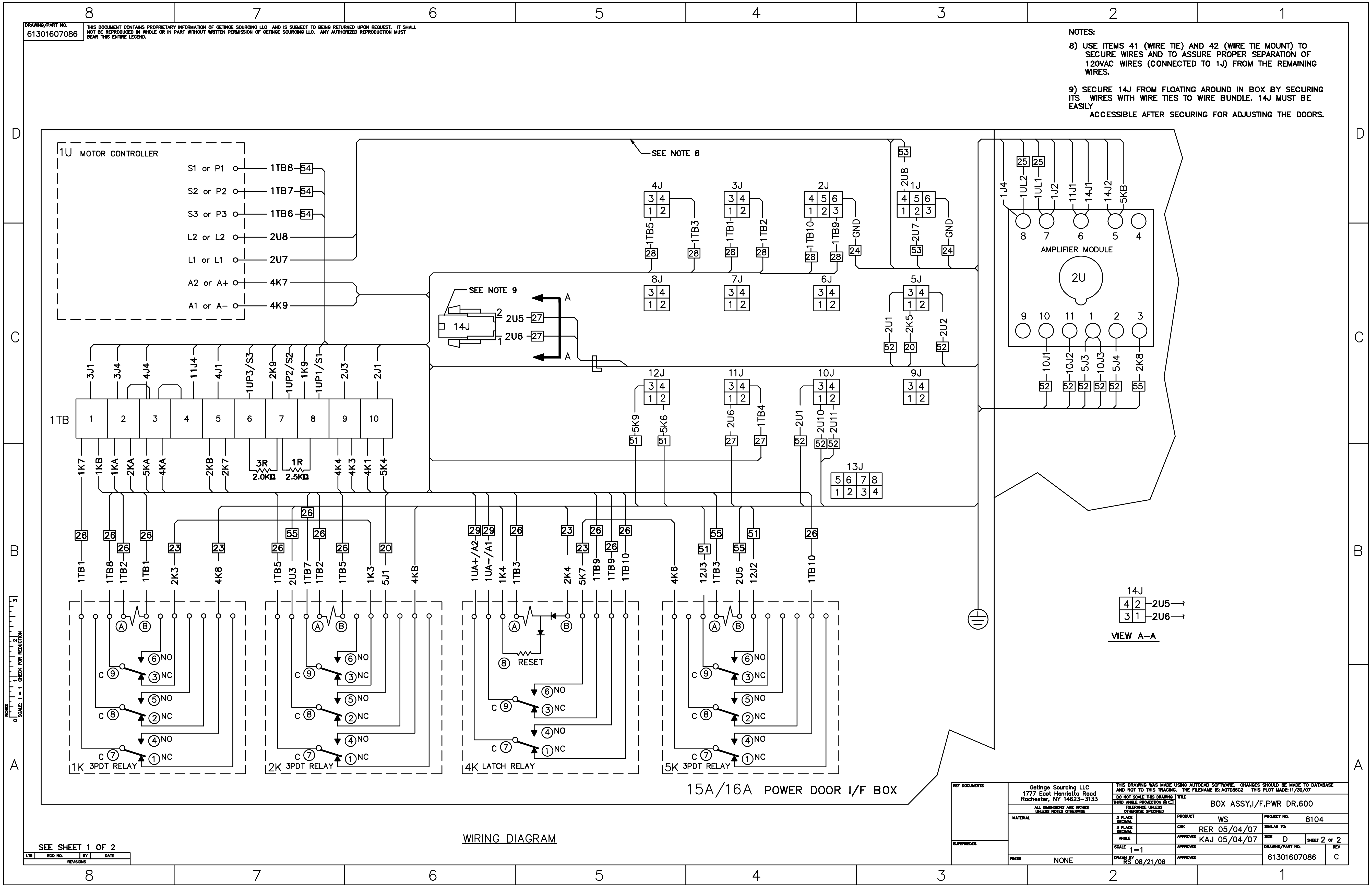
THIS DRAWING WAS CREATED USING INVENTOR SOFTWARE. CHANGES SHOULD BE MADE TO DATABASE. THE FILE NAME IS: A07086.iam
TITLE
BOX ASSY,I/F,PWR DR,600
SIZE D
DWG NO 61301607086
REV C
PROJECT NO. WP600
SHEET 1 OF 2

FIGURE 6–8, SHEET 2. DOOR I/F BOX 15A/16A WIRING DIAGRAM


DRAWING/PART NO. 61301607086
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NOTES:
8) USE ITEMS 41 (WIRE TIE) AND 42 (WIRE TIE MOUNT) TO SECURE WIRES AND TO ASSURE PROPER SEPARATION OF 120VAC WIRES (CONNECTED TO 1J) FROM THE REMAINING WIRES.
9) SECURE 14J FROM FLOATING AROUND IN BOX BY SECURING ITS WIRES WITH WIRE TIES TO WIRE BUNDLE. 14J MUST BE EASILY ACCESSIBLE AFTER SECURING FOR ADJUSTING THE DOORS.
1U MOTOR CONTROLLER
S1 or P1
S2 or P2
S3 or P3
L2 or L2
L1 or L1
A2 or A+
A1 or A−
SEE NOTE 8
SEE NOTE 9
14J
AMPLIFIER MODULE
2U
1TB
3R 2.0KΩ
1R 2.5KΩ
13J
1K 3PDT RELAY
2K 3PDT RELAY
4K LATCH RELAY
5K 3PDT RELAY
RESET
VIEW A–A
15A/16A POWER DOOR I/F BOX
WIRING DIAGRAM
SEE SHEET 1 OF 2
Getinge Sourcing LLC
1777 East Henrietta Road
Rochester, NY 14623-3133
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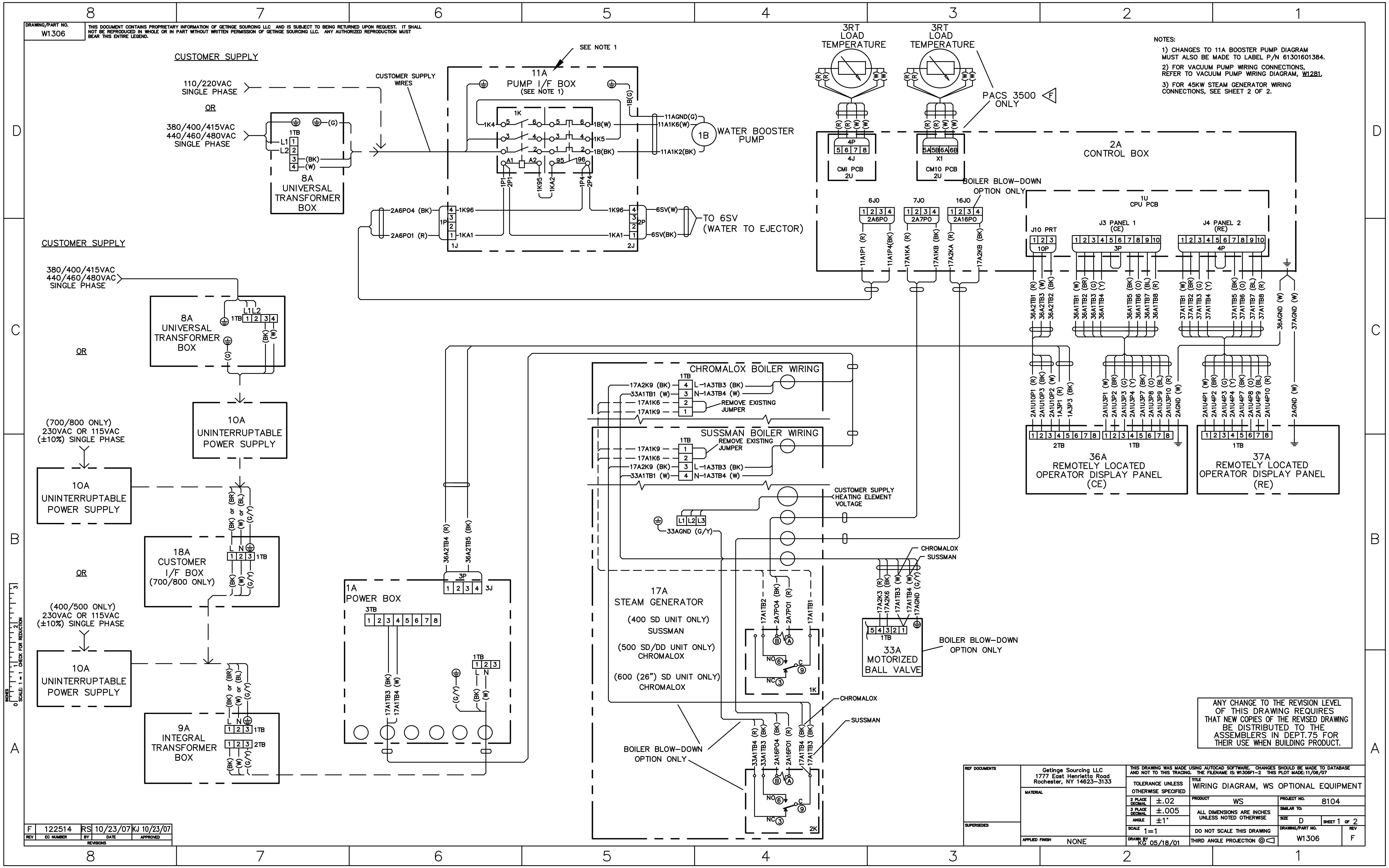
BOX ASSY,I/F,PWR DR,600
WS
8104
RER 05/04/07
KAJ 05/04/07
D
SHEET 2 OF 2
1=1
NONE
RS 08/21/06
61301607086
C

FIGURE 6–9, SHEET 1. OPTIONAL EQUIPMENT WIRING DIAGRAM


DRAWING/PART NO. W1306
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CUSTOMER SUPPLY
110/220VAC SINGLE PHASE
OR
380/400/415VAC 440/460/480VAC SINGLE PHASE
8A UNIVERSAL TRANSFORMER BOX
CUSTOMER SUPPLY WIRES
SEE NOTE 1
11A PUMP I/F BOX (SEE NOTE 1)
1B WATER BOOSTER PUMP
TO 6SV (WATER TO EJECTOR)
3RT LOAD TEMPERATURE
PACS 3500 ONLY
NOTES:
1) CHANGES TO 11A BOOSTER PUMP DIAGRAM MUST ALSO BE MADE TO LABEL P/N 61301601384.
2) FOR VACUUM PUMP WIRING CONNECTIONS, REFER TO VACUUM PUMP WIRING DIAGRAM, W1281.
3) FOR 45KW STEAM GENERATOR WIRING CONNECTIONS, SEE SHEET 2 OF 2.
2A CONTROL BOX
4J CMI PCB 2U
X1 CM10 PCB 2U
BOILER BLOW-DOWN OPTION ONLY
1U CPU PCB
J10 PRT
J3 PANEL 1 (CE)
J4 PANEL 2 (RE)
CUSTOMER SUPPLY
380/400/415VAC 440/460/480VAC SINGLE PHASE
8A UNIVERSAL TRANSFORMER BOX
OR
10A UNINTERRUPTABLE POWER SUPPLY
(700/800 ONLY) 230VAC OR 115VAC (±10%) SINGLE PHASE
10A UNINTERRUPTABLE POWER SUPPLY
18A CUSTOMER I/F BOX (700/800 ONLY)
OR
(400/500 ONLY) 230VAC OR 115VAC (±10%) SINGLE PHASE
10A UNINTERRUPTABLE POWER SUPPLY
9A INTEGRAL TRANSFORMER BOX
1A POWER BOX
CHROMALOX BOILER WIRING
REMOVE EXISTING JUMPER
SUSSMAN BOILER WIRING
REMOVE EXISTING JUMPER
CUSTOMER SUPPLY HEATING ELEMENT VOLTAGE
17A STEAM GENERATOR
(400 SD UNIT ONLY) SUSSMAN
(500 SD/DD UNIT ONLY) CHROMALOX
(600 (26") SD UNIT ONLY) CHROMALOX
BOILER BLOW-DOWN OPTION ONLY
CHROMALOX
SUSSMAN
33A MOTORIZED BALL VALVE
BOILER BLOW-DOWN OPTION ONLY
36A REMOTELY LOCATED OPERATOR DISPLAY PANEL (CE)
37A REMOTELY LOCATED OPERATOR DISPLAY PANEL (RE)
ANY CHANGE TO THE REVISION LEVEL OF THIS DRAWING REQUIRES THAT NEW COPIES OF THE REVISED DRAWING BE DISTRIBUTED TO THE ASSEMBLERS IN DEPT.75 FOR THEIR USE WHEN BUILDING PRODUCT.
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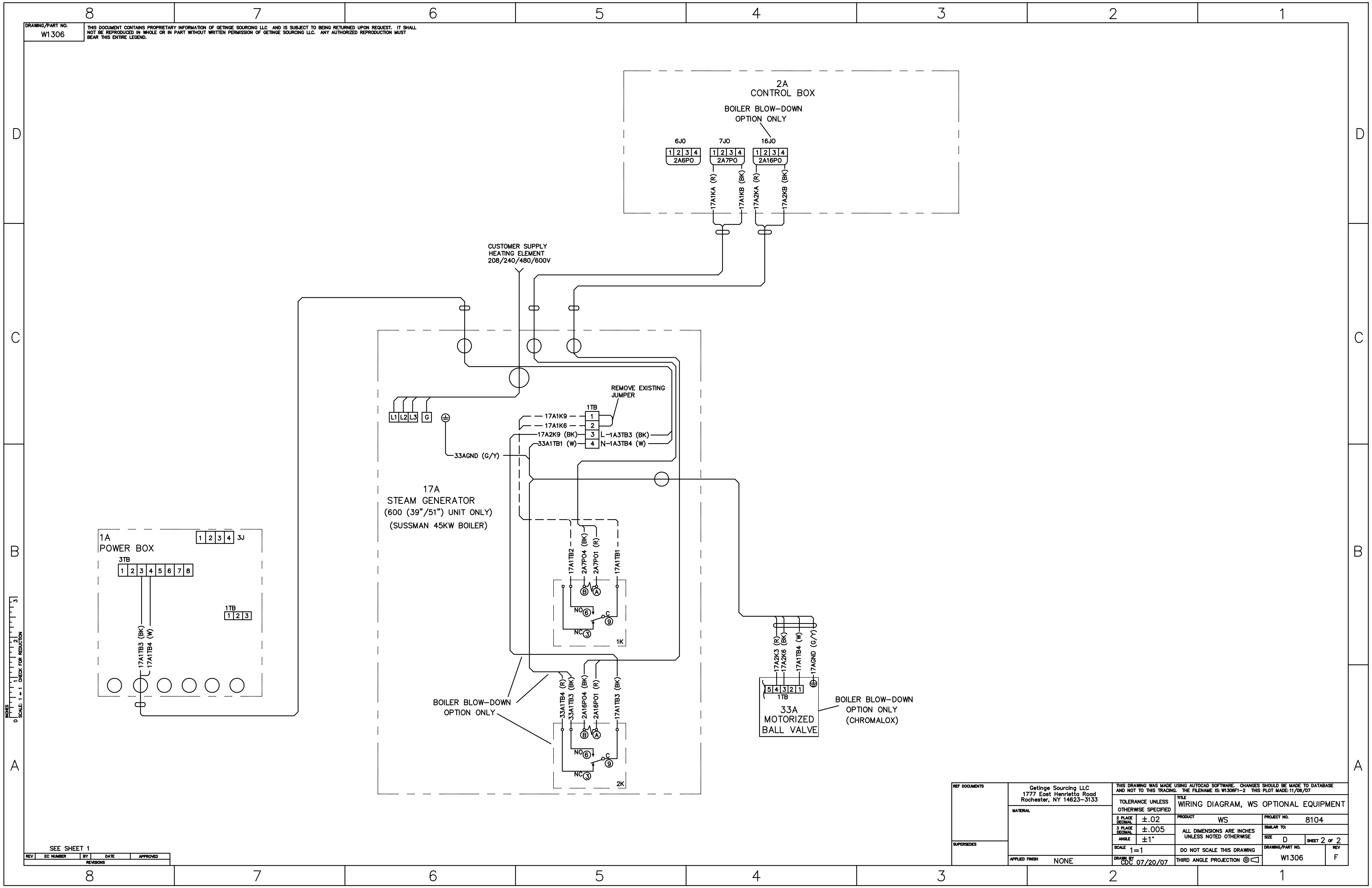
TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL ±.02
3 PLACE DECIMAL ±.005
ANGLE ±1°
SCALE 1=1
TITLE WIRING DIAGRAM, WS OPTIONAL EQUIPMENT
PRODUCT WS
PROJECT NO. 8104
ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE
SIZE D SHEET 1 OF 2
DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION
DRAWN BY KS 05/18/01
DRAWING/PART NO. W1306 REV F
APPLIED FINISH NONE
F 122514 RS 10/23/07 KJ 10/23/07
REV EC NUMBER BY DATE APPROVED
REVISIONS

FIGURE 6–9, SHEET 2. OPTIONAL EQUIPMENT WIRING DIAGRAM


8
7
6
5
4
3
2
1
D
C
B
A
DRAWING/PART NO.
W1306
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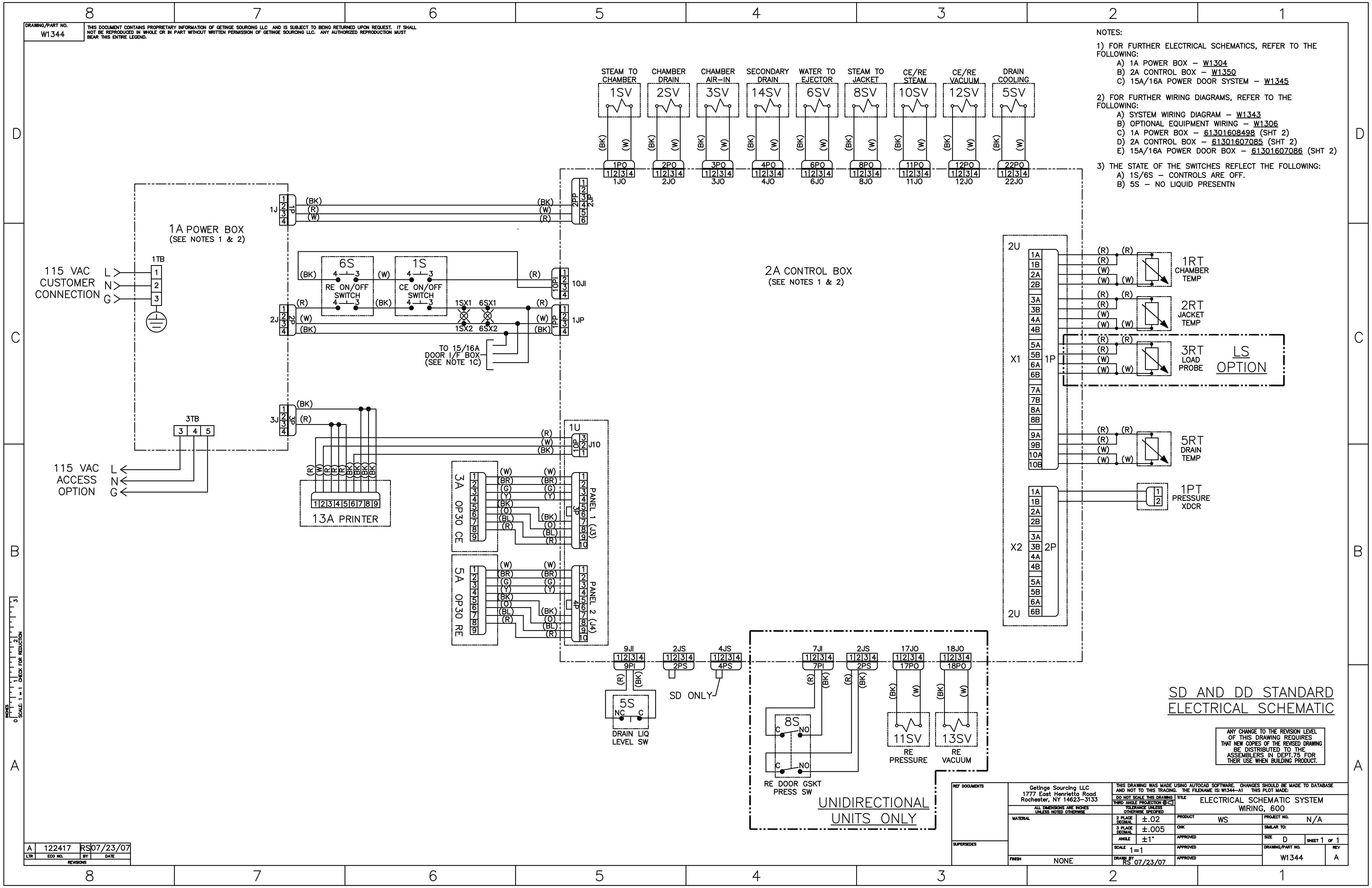
2A
CONTROL BOX
BOILER BLOW–DOWN
OPTION ONLY
6J0
7J0
16J0
1 2 3 4
2A6PO
2A7PO
2A16PO
17A1KA (R)
17A1KB (BK)
17A2KA (R)
17A2KB (BK)
CUSTOMER SUPPLY
HEATING ELEMENT
208/240/480/600V
L1 L2 L3 G
REMOVE EXISTING
JUMPER
1TB
17A1K9
17A1K6
17A2K9 (BK)
33A1TB1 (W)
L–1A3TB3 (BK)
N–1A3TB4 (W)
33AGND (G/Y)
17A
STEAM GENERATOR
(600 (39"/51") UNIT ONLY)
(SUSSMAN 45KW BOILER)
17A1TB2
2A7PO4 (BK)
2A7PO1 (R)
17A1TB1
B
A
NO 6
C 9
NC 3
1K
BOILER BLOW–DOWN
OPTION ONLY
33A1TB4 (R)
33A1TB3 (BK)
2A16PO4 (BK)
2A16PO1 (R)
17A1TB3 (BK)
2K
1A
POWER BOX
1 2 3 4 3J
3TB
1 2 3 4 5 6 7 8
1TB
1 2 3
17A1TB3 (BK)
17A1TB4 (W)
17A2K3 (R)
17A2K6 (BK)
17A1TB4 (W)
17AGND (G/Y)
5 4 3 2 1
1TB
33A
MOTORIZED
BALL VALVE
BOILER BLOW–DOWN
OPTION ONLY
(CHROMALOX)
INCHES
SCALE: 1 = 1 CHECK FOR REDUCTION
0 1 2 3
SEE SHEET 1
REV EC NUMBER BY DATE APPROVED
REVISIONS
REF DOCUMENTS
SUPERSEDES
Getinge Sourcing LLC
1777 East Henrietta Road
Rochester, NY 14623–3133
MATERIAL
APPLIED FINISH NONE
THIS DRAWING WAS MADE USING AUTOCAD SOFTWARE. CHANGES SHOULD BE MADE TO DATABASE AND NOT TO THIS TRACING. THE FILENAME IS: W1306F1–2 THIS PLOT MADE: 11/06/07
TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL ±.02
3 PLACE DECIMAL ±.005
ANGLE ±1°
SCALE 1=1
DRAWN BY CDC 07/20/07
TITLE
WIRING DIAGRAM, WS OPTIONAL EQUIPMENT
PRODUCT WS
ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE
DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION
PROJECT NO. 8104
SIMILAR TO:
SIZE D
SHEET 2 OF 2
DRAWING/PART NO. W1306
REV F

FIGURE 6–10. SYSTEM ELECTRICAL SCHEMATIC



DRAWING/PART NO. W1344

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NOTES:

1) FOR FURTHER ELECTRICAL SCHEMATICS, REFER TO THE FOLLOWING:
  A) 1A POWER BOX – W1304
  B) 2A CONTROL BOX – W1350
  C) 15A/16A POWER DOOR SYSTEM – W1345

2) FOR FURTHER WIRING DIAGRAMS, REFER TO THE FOLLOWING:
  A) SYSTEM WIRING DIAGRAM – W1343
  B) OPTIONAL EQUIPMENT WIRING – W1306
  C) 1A POWER BOX – 61301608498 (SHT 2)
  D) 2A CONTROL BOX – 61301607085 (SHT 2)
  E) 15A/16A POWER DOOR BOX – 61301607086 (SHT 2)

3) THE STATE OF THE SWITCHES REFLECT THE FOLLOWING:
  A) 1S/6S – CONTROLS ARE OFF.
  B) 5S – NO LIQUID PRESENTN

SD AND DD STANDARD ELECTRICAL SCHEMATIC

ANY CHANGE TO THE REVISION LEVEL OF THIS DRAWING REQUIRES THAT NEW COPIES OF THE REVISED DRAWING BE DISTRIBUTED TO THE ASSEMBLERS IN DEPT.75 FOR THEIR USE WHEN BUILDING PRODUCT.

LTR	ECO NO.	BY	DATE
A	122417	RS	07/23/07

REVISIONS

REF DOCUMENTS

SUPERSEDES

Getinge Sourcing LLC
1777 East Henrietta Road
Rochester, NY 14623–3133

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MATERIAL

FINISH NONE

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DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION

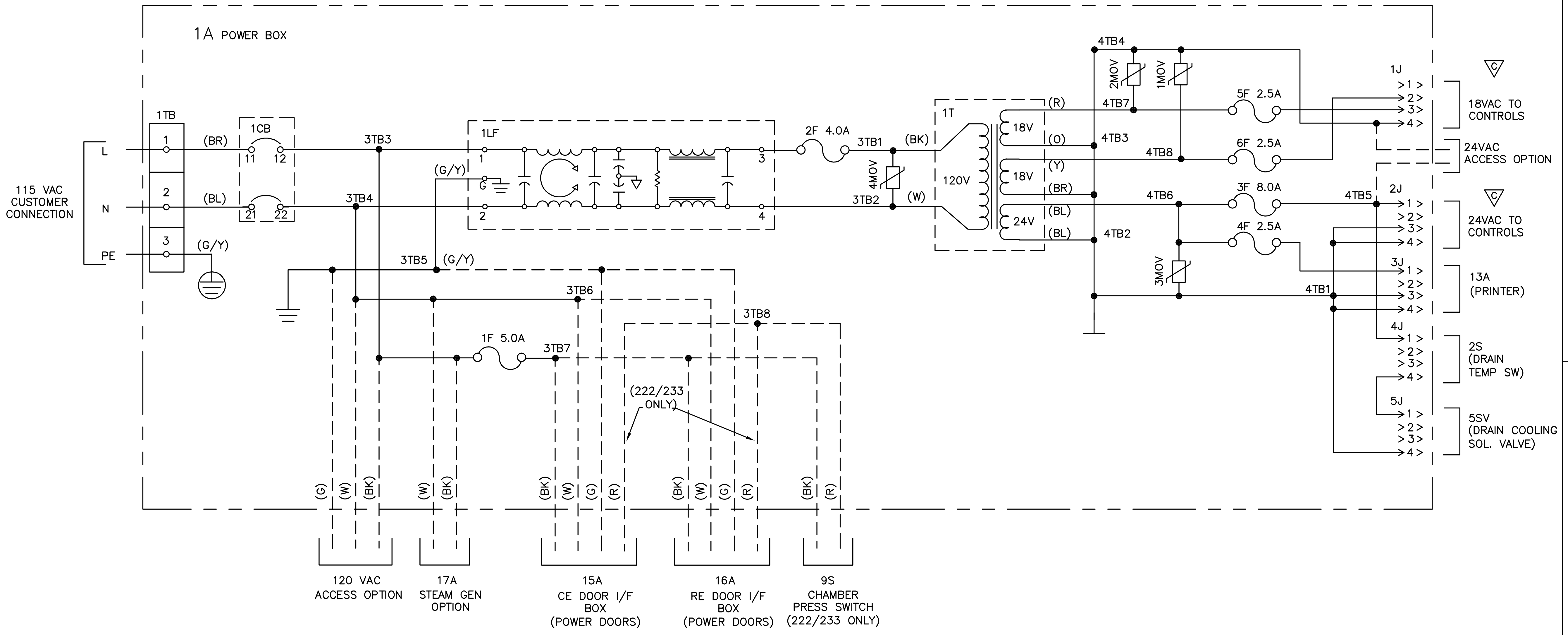
TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL ±.02
3 PLACE DECIMAL ±.005
ANGLE ±1°
SCALE 1=1
DRAWN BY RS 07/23/07

TITLE ELECTRICAL SCHEMATIC SYSTEM WIRING, 600
PRODUCT WS
PROJECT NO. N/A
CHK
SIMILAR TO:
APPROVED
SIZE D
SHEET 1 OF 1
APPROVED
DRAWING/PART NO. W1344
REV A
APPROVED

8
7
6
5
4
3
2
1
D
C
B
A
STEAM TO CHAMBER
1SV
CHAMBER DRAIN
2SV
CHAMBER AIR–IN
3SV
SECONDARY DRAIN
14SV
WATER TO EJECTOR
6SV
STEAM TO JACKET
8SV
CE/RE STEAM
10SV
CE/RE VACUUM
12SV
DRAIN COOLING
5SV
1PO
1JO
2PO
2JO
3PO
3JO
4PO
4JO
6PO
6JO
8PO
8JO
11PO
11JO
12PO
12JO
22PO
22JO
(BK)
(W)
(R)
1A POWER BOX
(SEE NOTES 1 & 2)
1J
1P
2PP
2JP
2A CONTROL BOX
(SEE NOTES 1 & 2)
115 VAC CUSTOMER CONNECTION
L
N
G
1TB
6S
RE ON/OFF SWITCH
1S
CE ON/OFF SWITCH
1SX1
6SX1
1SX2
6SX2
10PI
10JI
2J
2P
1PP
1JP
TO 15/16A DOOR I/F BOX (SEE NOTE 1C)
3TB
3J
3P
115 VAC ACCESS OPTION
1U
10P
J10
13A PRINTER
3A OP30 CE
5A OP30 RE
(BR)
(G)
(Y)
(O)
(BL)
PANEL 1 (J3)
3P
PANEL 2 (J4)
4P
2U
X1
1P
X2
2P
1RT
CHAMBER TEMP
2RT
JACKET TEMP
3RT
LOAD PROBE
LS OPTION
5RT
DRAIN TEMP
1PT
PRESSURE XDCR
9JI
9PI
2JS
2PS
4JS
4PS
7JI
7PI
17JO
17PO
18JO
18PO
5S
NC
C
DRAIN LIQ LEVEL SW
SD ONLY
8S
NO
RE DOOR GSKT PRESS SW
11SV
RE PRESSURE
13SV
RE VACUUM
UNIDIRECTIONAL UNITS ONLY
INCHES
SCALE: 1 = 1 CHECK FOR REDUCTION

FIGURE 6–11. POWER BOX 1A ELECTRICAL SCHEMATIC

DRAWING/PART NO.	
W1304	THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GETINGE SOURCING LLC AND IS SUBJECT TO BEING RETURNED UPON REQUEST. IT SHALL NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION OF GETINGE SOURCING LLC. ANY AUTHORIZED REPRODUCTION MUST BEAR THIS ENTIRE LEGEND.


1A POWER BOX
115 VAC
CUSTOMER
CONNECTION
L
N
PE
1TB
1
2
3
(BR)
(BL)
(G/Y)
1CB
11
12
21
22
3TB3
3TB4
3TB5
(G/Y)
1LF
1
2
3
4
G
2F 4.0A
3TB1
3TB2
4MOV
(BK)
(W)
1T
120V
18V
18V
24V
(R)
(O)
(Y)
(BR)
(BL)
(BL)
4TB4
2MOV
1MOV
4TB7
4TB3
4TB8
4TB6
4TB2
3MOV
4TB1
4TB5
5F 2.5A
6F 2.5A
3F 8.0A
4F 2.5A
1J
2J
3J
4J
5J
>1>
>2>
>3>
>4>
C
18VAC TO
CONTROLS
24VAC
ACCESS OPTION
24VAC TO
CONTROLS
13A
(PRINTER)
2S
(DRAIN
TEMP SW)
5SV
(DRAIN COOLING
SOL. VALVE)
3TB6
3TB8
1F 5.0A
3TB7
(222/233
ONLY)
(G)
(W)
(BK)
(W)
(BK)
(BK)
(W)
(G)
(R)
(BK)
(W)
(G)
(R)
(BK)
(R)
120 VAC
ACCESS OPTION
17A
STEAM GEN
OPTION
15A
CE DOOR I/F
BOX
(POWER DOORS)
16A
RE DOOR I/F
BOX
(POWER DOORS)
9S
CHAMBER
PRESS SWITCH
(222/233 ONLY)

INCHES 0 1 2 3 SCALE: 1 = 1 CHECK FOR REDUCTION

REF DOCUMENTS

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Rochester, NY 14623–3133

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TOLERANCE UNLESS OTHERWISE SPECIFIED

TITLE ELECTRICAL SCHEMATIC POWER BOX

2 PLACE DECIMAL	±.02
3 PLACE DECIMAL	±.005
ANGLE	±1°
SCALE	1=2
DRAWN BY	KG 04/04/01

PRODUCT WS PACS 3500

PROJECT NO. 8104D

SIMILAR TO:

ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE

SIZE B SHEET 1 OF 1

DO NOT SCALE THIS DRAWING

THIRD ANGLE PROJECTION

DRAWING/PART NO. W1304 REV C

MATERIAL

APPLIED FINISH NONE

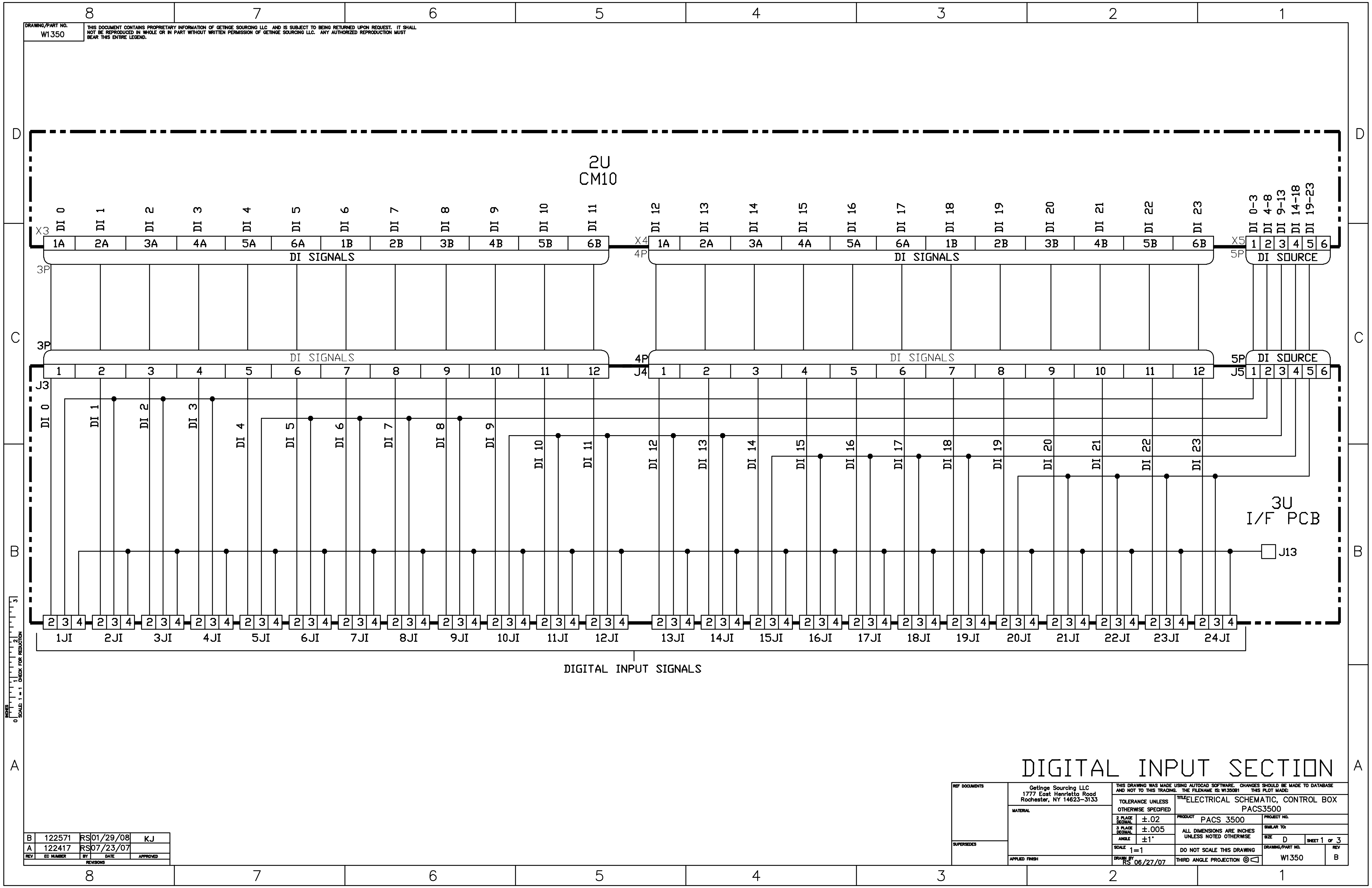
SUPERSEDES

CHK CDC 10/01/01
APPROVED
APPROVED
APPROVAL

REV	EC NUMBER	BY	DATE	APPROVED
C	122527	CC	03/10/08	KJ 11/15/08
B	120392	KG	12/03/01	
A	120219	RR	9/24/01	

REVISIONS

FIGURE 6–12, SHEET 1.   CONTROL BOX ELECTRICAL SCHEMATIC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2U
CM10
X3
3P
DI SIGNALS
1A 2A 3A 4A 5A 6A 1B 2B 3B 4B 5B 6B
DI 0 DI 1 DI 2 DI 3 DI 4 DI 5 DI 6 DI 7 DI 8 DI 9 DI 10 DI 11
X4
4P
DI 12 DI 13 DI 14 DI 15 DI 16 DI 17 DI 18 DI 19 DI 20 DI 21 DI 22 DI 23
X5
5P
DI SOURCE
DI 0-3 DI 4-8 DI 9-13 DI 14-18 DI 19-23
1 2 3 4 5 6
J3
J4
J5
1 2 3 4 5 6 7 8 9 10 11 12
3U
I/F PCB
J13
2 3 4
1JI 2JI 3JI 4JI 5JI 6JI 7JI 8JI 9JI 10JI 11JI 12JI 13JI 14JI 15JI 16JI 17JI 18JI 19JI 20JI 21JI 22JI 23JI 24JI
DIGITAL INPUT SIGNALS
INCHES
SCALE: 1 = 1 CHECK FOR REDUCTION
DIGITAL INPUT SECTION
REF DOCUMENTS
SUPERSEDES
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Rochester, NY 14623–3133
MATERIAL
APPLIED FINISH
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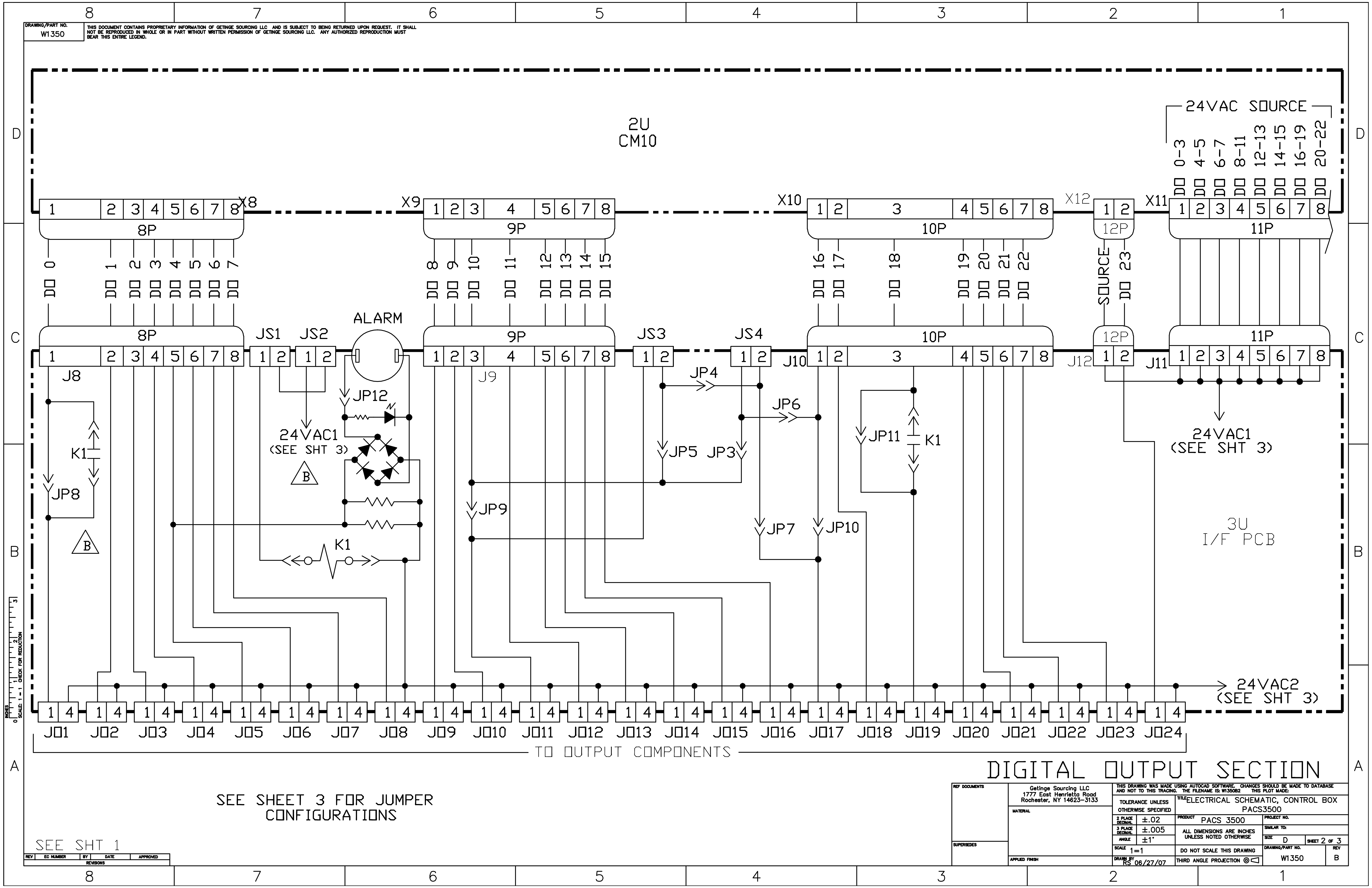
TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL ±.02
3 PLACE DECIMAL ±.005
ANGLE ±1°
SCALE 1=1
DRAWN BY RS 06/27/07
TITLE ELECTRICAL SCHEMATIC, CONTROL BOX PACS3500
PRODUCT PACS 3500
ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE
DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION
PROJECT NO.
SIMILAR TO:
SIZE D
SHEET 1 OF 3
DRAWING/PART NO. W1350
REV B
B 122571 RS 01/29/08 KJ
A 122417 RS 07/23/07
REV EC NUMBER BY DATE APPROVED
REVISIONS
A B C D
1 2 3 4 5 6 7 8

FIGURE 6–12, SHEET 2. CONTROL BOX ELECTRICAL SCHEMATIC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2U
CM10
24VAC SOURCE
DO 0-3
DO 4-5
DO 6-7
DO 8-11
DO 12-13
DO 14-15
DO 16-19
DO 20-22
X8
X9
X10
X12
X11
8P
9P
10P
12P
11P
DO 0
DO 1
DO 2
DO 3
DO 4
DO 5
DO 6
DO 7
DO 8
DO 9
DO 10
DO 11
DO 12
DO 13
DO 14
DO 15
DO 16
DO 17
DO 18
DO 19
DO 20
DO 21
DO 22
SOURCE
DO 23
ALARM
JS1
JS2
JS3
JS4
J8
J9
J10
J12
J11
JP12
24VAC1
(SEE SHT 3)
B
K1
JP8
JP4
JP6
JP5
JP3
JP9
JP7
JP10
JP11
3U
I/F PCB
24VAC2
(SEE SHT 3)
JO1
JO2
JO3
JO4
JO5
JO6
JO7
JO8
JO9
JO10
JO11
JO12
JO13
JO14
JO15
JO16
JO17
JO18
JO19
JO20
JO21
JO22
JO23
JO24
TO OUTPUT COMPONENTS
DIGITAL OUTPUT SECTION
SEE SHEET 3 FOR JUMPER CONFIGURATIONS
SEE SHT 1
REV
EC NUMBER
BY
DATE
APPROVED
REVISIONS
INCHES
SCALE: 1 = 1 CHECK FOR REDUCTION
REF DOCUMENTS
SUPERSEDES
Getinge Sourcing LLC
1777 East Henrietta Road
Rochester, NY 14623-3133
MATERIAL
APPLIED FINISH
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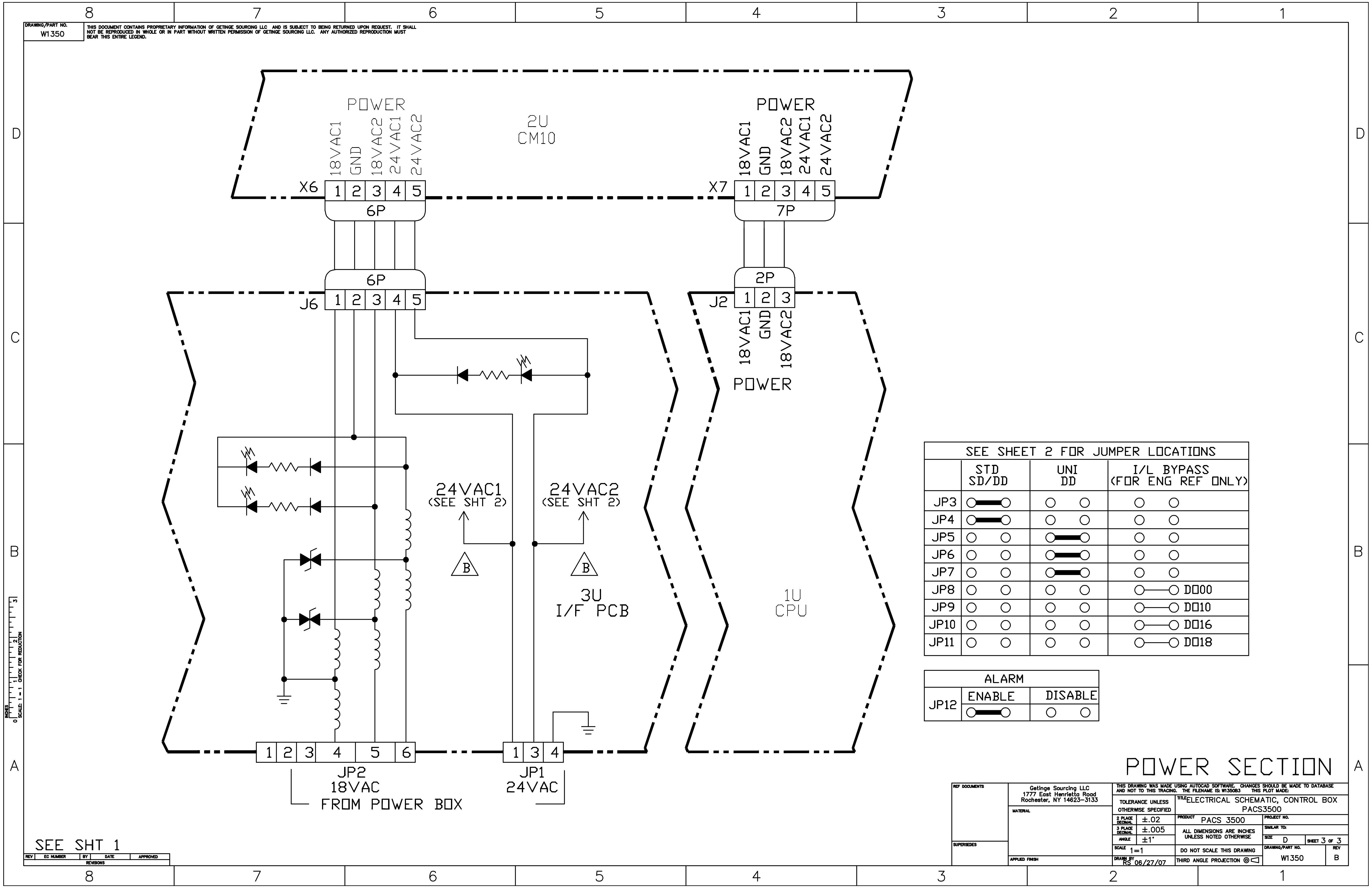
TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL ±.02
3 PLACE DECIMAL ±.005
ANGLE ±1°
SCALE 1=1
DRAWN BY RS 06/27/07
TITLE ELECTRICAL SCHEMATIC, CONTROL BOX PACS3500
PRODUCT PACS 3500
ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE
DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION
PROJECT NO.
SIMILAR TO:
SIZE D
SHEET 2 OF 3
DRAWING/PART NO. W1350
REV B

FIGURE 6–12, SHEET 3. CONTROL BOX ELECTRICAL SCHEMATIC


8
7
6
5
4
3
2
1
D
C
B
A
DRAWING/PART NO.
W1350
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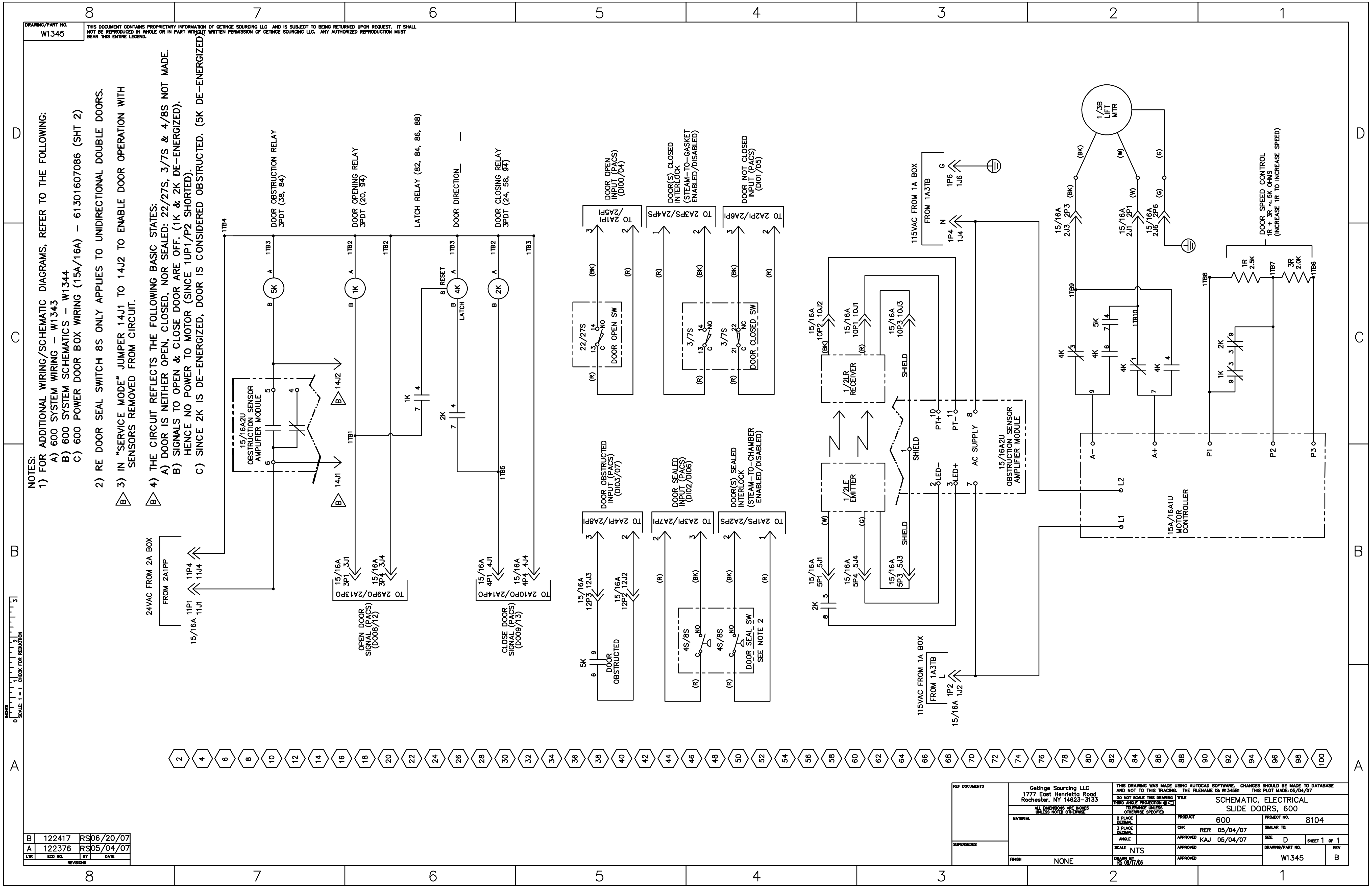
POWER
18VAC1
GND
18VAC2
24VAC1
24VAC2
2U
CM10
X6
1 2 3 4 5
6P
POWER
X7
7P
6P
J6
2P
J2
1 2 3
18VAC1
GND
18VAC2
POWER
24VAC1
(SEE SHT 2)
24VAC2
(SEE SHT 2)
B
B
3U
I/F PCB
1U
CPU
1 2 3 4 5 6
JP2
18VAC
FROM POWER BOX
1 3 4
JP1
24VAC
SEE SHT 1
REV
EC NUMBER
BY
DATE
APPROVED
REVISIONS
INCHES
SCALE: 1 = 1 CHECK FOR REDUCTION
0 1 2 3
POWER SECTION
REF DOCUMENTS
SUPERSEDES
Getinge Sourcing LLC
1777 East Henrietta Road
Rochester, NY 14623–3133
MATERIAL
APPLIED FINISH
THIS DRAWING WAS MADE USING AUTOCAD SOFTWARE. CHANGES SHOULD BE MADE TO DATABASE AND NOT TO THIS TRACING. THE FILENAME IS: W1350B3 THIS PLOT MADE:
TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL ±.02
3 PLACE DECIMAL ±.005
ANGLE ±1°
SCALE 1=1
DRAWN BY RS 06/27/07
TITLE ELECTRICAL SCHEMATIC, CONTROL BOX PACS3500
PRODUCT PACS 3500
ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE
DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION
PROJECT NO.
SIMILAR TO:
SIZE D
SHEET 3 OF 3
DRAWING/PART NO. W1350
REV B

SEE SHEET 2 FOR JUMPER LOCATIONS			
	STD SD/DD	UNI DD	I/L BYPASS (FOR ENG REF ONLY)
JP3	○━○	○ ○	○ ○
JP4	○━○	○ ○	○ ○
JP5	○ ○	○━○	○ ○
JP6	○ ○	○━○	○ ○
JP7	○ ○	○━○	○ ○
JP8	○ ○	○ ○	○—○ DO00
JP9	○ ○	○ ○	○—○ DO10
JP10	○ ○	○ ○	○—○ DO16
JP11	○ ○	○ ○	○—○ DO18

	ALARM	
	ENABLE	DISABLE
JP12	○━○	○ ○

FIGURE 6–13. SLIDE DOORS ELECTRICAL SCHEMATIC



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DOOR OBSTRUCTION RELAY 3PDT (38, 84)
DOOR OPENING RELAY 3PDT (20, 94)
LATCH RELAY (82, 84, 86, 88)
DOOR DIRECTION
DOOR CLOSING RELAY 3PDT (24, 58, 94)
DOOR OPEN INPUT (PACS) (DI00/04)
DOOR(S) CLOSED INTERLOCK (STEAM-TO-GASKET ENABLED/DISABLED)
DOOR NOT CLOSED INPUT (PACS) (DI01/05)
115VAC FROM 1A BOX FROM 1A3TB
1/3B LIFT MTR
DOOR SPEED CONTROL 1R + 3R ~5K OHMS (INCREASE 1R TO INCREASE SPEED)
15/16A2U OBSTRUCTION SENSOR AMPLIFIER MODULE
1/2LR RECEIVER
1/2LE EMITTER
15A/16A1U MOTOR CONTROLLER
24VAC FROM 2A BOX FROM 2A1PP
OPEN DOOR SIGNAL (PACS) (DO08/12)
CLOSE DOOR SIGNAL (PACS) (DO09/13)
DOOR OBSTRUCTED INPUT (PACS) (DI03/07)
DOOR SEALED INPUT (PACS) (DI02/DI06)
DOOR(S) SEALED INTERLOCK (STEAM-TO-CHAMBER ENABLED/DISABLED)
DOOR OPEN SW
DOOR CLOSED SW
DOOR SEAL SW SEE NOTE 2
DOOR OBSTRUCTED
Getinge Sourcing LLC 1777 East Henrietta Road Rochester, NY 14623-3133
SCHEMATIC, ELECTRICAL SLIDE DOORS, 600
PRODUCT 600
PROJECT NO. 8104
CHK RER 05/04/07
APPROVED KAJ 05/04/07
SIZE D
SHEET 1 OF 1
SCALE NTS
FINISH NONE
DRAWING/PART NO. W1345
REV B

NOTES:
1) FOR ADDITIONAL WIRING/SCHEMATIC DIAGRAMS, REFER TO THE FOLLOWING:
 A) 600 SYSTEM WIRING – W1343
 B) 600 SYSTEM SCHEMATICS – W1344
 C) 600 POWER DOOR BOX WIRING (15A/16A) – 61301607086 (SHT 2)
2) RE DOOR SEAL SWITCH 8S ONLY APPLIES TO UNIDIRECTIONAL DOUBLE DOORS.
3) IN "SERVICE MODE" JUMPER 14J1 TO 14J2 TO ENABLE DOOR OPERATION WITH SENSORS REMOVED FROM CIRCUIT.
4) THE CIRCUIT REFLECTS THE FOLLOWING BASIC STATES:
 A) DOOR IS NEITHER OPEN, CLOSED, NOR SEALED: 22/27S, 3/7S & 4/8S NOT MADE.
 B) SIGNALS TO OPEN & CLOSE DOOR ARE OFF. (1K & 2K DE-ENERGIZED). HENCE NO POWER TO MOTOR (SINCE 1UP1/P2 SHORTED).
 C) SINCE 2K IS DE-ENERGIZED, DOOR IS CONSIDERED OBSTRUCTED. (5K DE-ENERGIZED)

L'TR	ECO NO.	BY	DATE
B	122417	RS	06/20/07
A	122376	RS	05/04/07

FIGURE 6–14, SHEET 1. GTS-30A STEAM BOILER

DRAWING/PART NO.
700576

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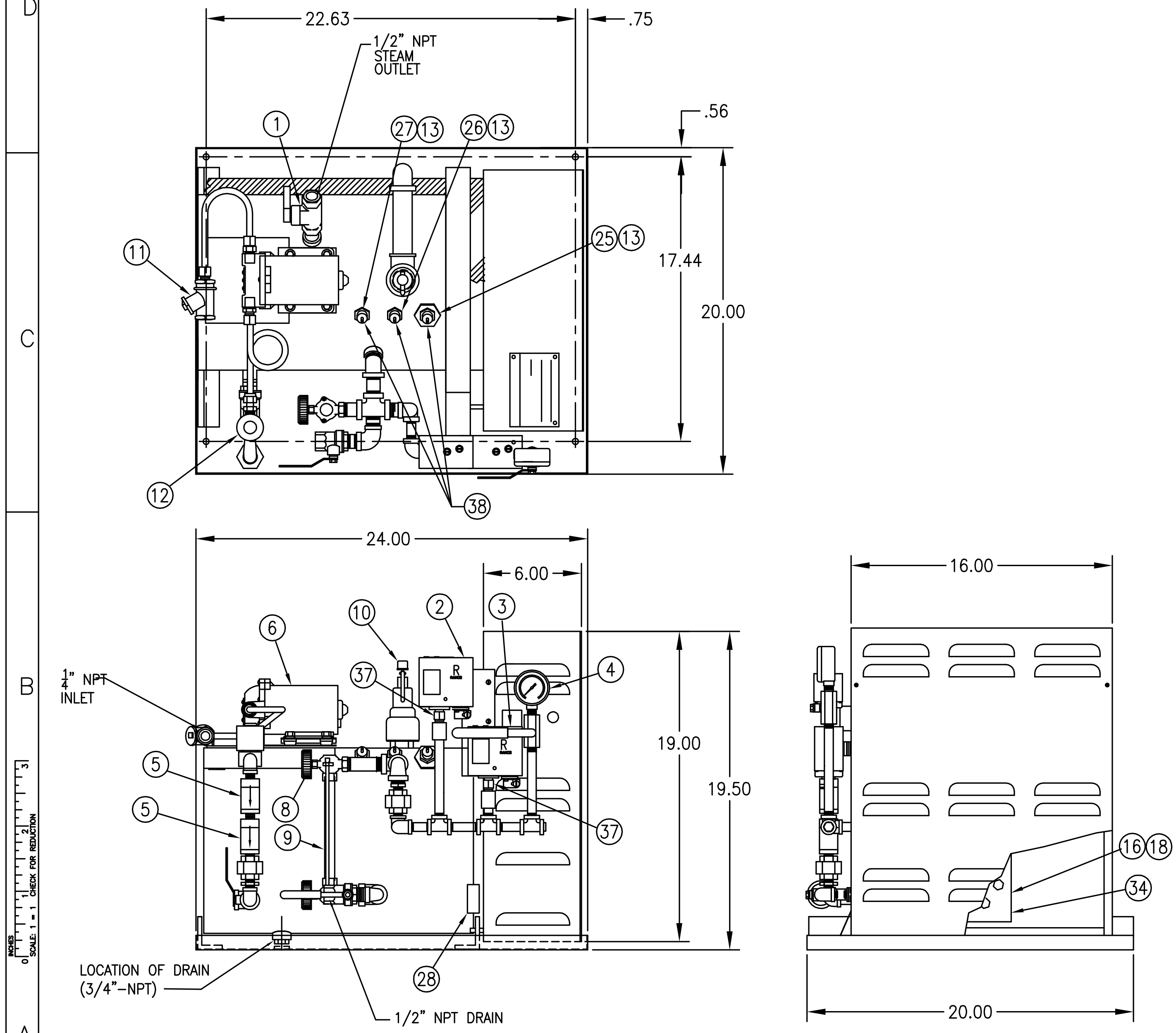

NAME: STEAM GENERATOR, 30KW, CHROMALOX

SPEC:
1) UNIT COMPLETE WITH FEED WATER PUMP.
2) MUST BE UL AND cUL LISTED, IEC 61010-1 COMPLIANT.
3) GENERATOR MUST BE BUILT IN ACCORDANCE WITH REQUIREMENTS OF SECTION 1 OF THE ASME BOILER AND PRESSURE VESSEL CODE AND BEAR THE NATIONAL BOARD STAMP. DATA SHEET TO BE FURNISHED (P2A FORM). ALL BOILERS MUST HAVE CRN APPROVAL AND BE STAMPED ACCORDINGLY.
4) ALL SWITCHES AND RELAYS ARE SHOWN IN OFF OR DE-ENERGIZED POSITIONS.
5) MATERIALS:
   A) SHELL: CARBON STEEL
   B) NIPPLES: BRASS
   C) ELBOWS, VALVES: BRASS
   D) TUBING: COPPER
6) PARTS LIST ON SHEET 2 OF 2
7) UNIT TO BE TESTED AND SHIPPED WITH GAUGE VALVES FULLY OPENED.
8) CONTROL BOX COLOR – PM286 MEDIUM BLUE

SOURCE OF SUPPLY: MFR: CHROMALOX
EDINBORO, PA.
D MODEL NO: SEE CHART
CHROMALOX CAT. NO: SEE CHART

	GETINGE PART NUMBER	61301607069	61301607070	61301607072	61301607073	61301607074
D	GETINGE REVISION	B	B	B	B	B
D	LATEST ECO	122551	122551	122551	122551	122551
D	CHROMALOX PART NUMBER	022-640007-002	022-640007-003	022-640007-005	022-640007-001	022-640007-007
D	CHROMALOX MODEL NUMBER	GTS-30AM0P3-203	GTS-30AM0P3-243	GTS-30AM0P3-413	GTS-30AM0P3-483	GTS-30AM0P3-603
	CHROMALOX REVISION	5	3	2	3	3
	KW RATING	30 KW	30 KW	30 KW	30 KW	30 KW
	CONTROL VOLTAGE	120/1PH	120/1PH	120/1PH	120/1PH	120/1PH
	POWER VOLTAGE	208V/3PH	240V/3PH	380/415V/3PH	480V/3PH	600V/3PH
	CURRENT AMPERAGE	83.3A	72.2A	41.7A	36.1A	28.8A
	CONTROL AMPERAGE	5.2	5.2	5.2	5.2	5.2
	CONTACTOR	2-50A, 3 POLE	2-50A, 3 POLE	1-50A, 3 POLE	1-50A, 3 POLE	1-50A, 3 POLE
	HEATING ELEMENT	2-15KW	2-15KW	1-30KW	1-30KW	1-30KW
	HZ	50/60 HZ	50/60 HZ	50/60 HZ	50/60 HZ	50/60 HZ
SETTINGS	HI-LIMIT PRESSURE	70 PSIG	70 PSIG	70 PSIG	70 PSIG	70 PSIG
	OPERATING PRESSURE	45-55 PSIG	45-55 PSIG	45-55 PSIG	45-55 PSIG	45-55 PSIG

NOTE:
1) TO GETINGE PURCHASING: DO NOT CHANGE, DEVIATE OR SUBSTITUTE THIS PART WITHOUT THE PRIOR WRITTEN APPROVAL FROM GETINGE SOURCING ENGINEERING.

"SPECIFICATION CONTROL DRAWING"

LTR	ECO NO.	BY	DATE
D	122551	TL	12/6/07
C	122270	AP	10/11/06
B	122250	TL	8/10/06
A	122222	TL	5/11/06

REVISIONS

REF DOCUMENTS

SUPERSEDES

Getinge Sourcing LLC
1777 East Henrietta Road
Rochester, NY 14623-3133

ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE

MATERIAL

FINISH NONE

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DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION

TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL
3 PLACE DECIMAL
ANGLE

SCALE NTS

DRAWN BY T.LEHMAN 4/11/06

TITLE GENERATOR, STEAM, CHROMALOX, 30KW, BASIC

PRODUCT 500 SERIES

CHK

APPROVED

APPROVED

APPROVED

PROJECT NO.

SIMILAR TO: 60281

SIZE D SHEET 1 OF 2

DRAWING/PART NO. 700576

REV D

FIGURE 6–14, SHEET 2. GTS-30A STEAM BOILER

DRAWING/PART NO.
700576

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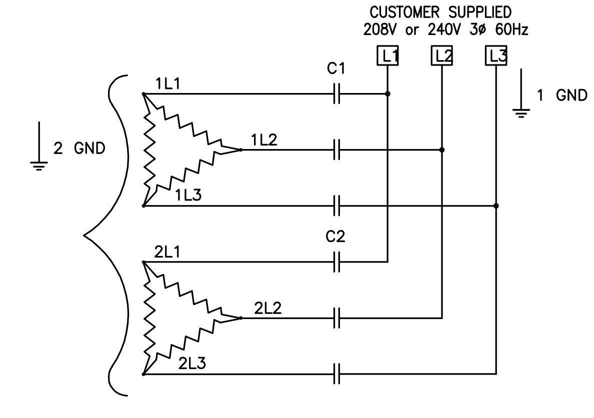
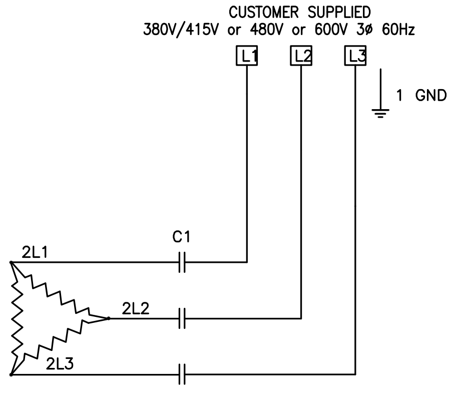

CUSTOMER SUPPLIED
208V or 240V 3ø 60Hz
L1
L2
L3
1 GND
2 GND
1L1
1L2
1L3
2L1
2L2
2L3
C1
C2

FOR 208V or 240V ONLY


CUSTOMER SUPPLIED
380V/415V or 480V or 600V 3ø 60Hz
L1
L2
L3
1 GND
2L1
2L2
2L3
C1

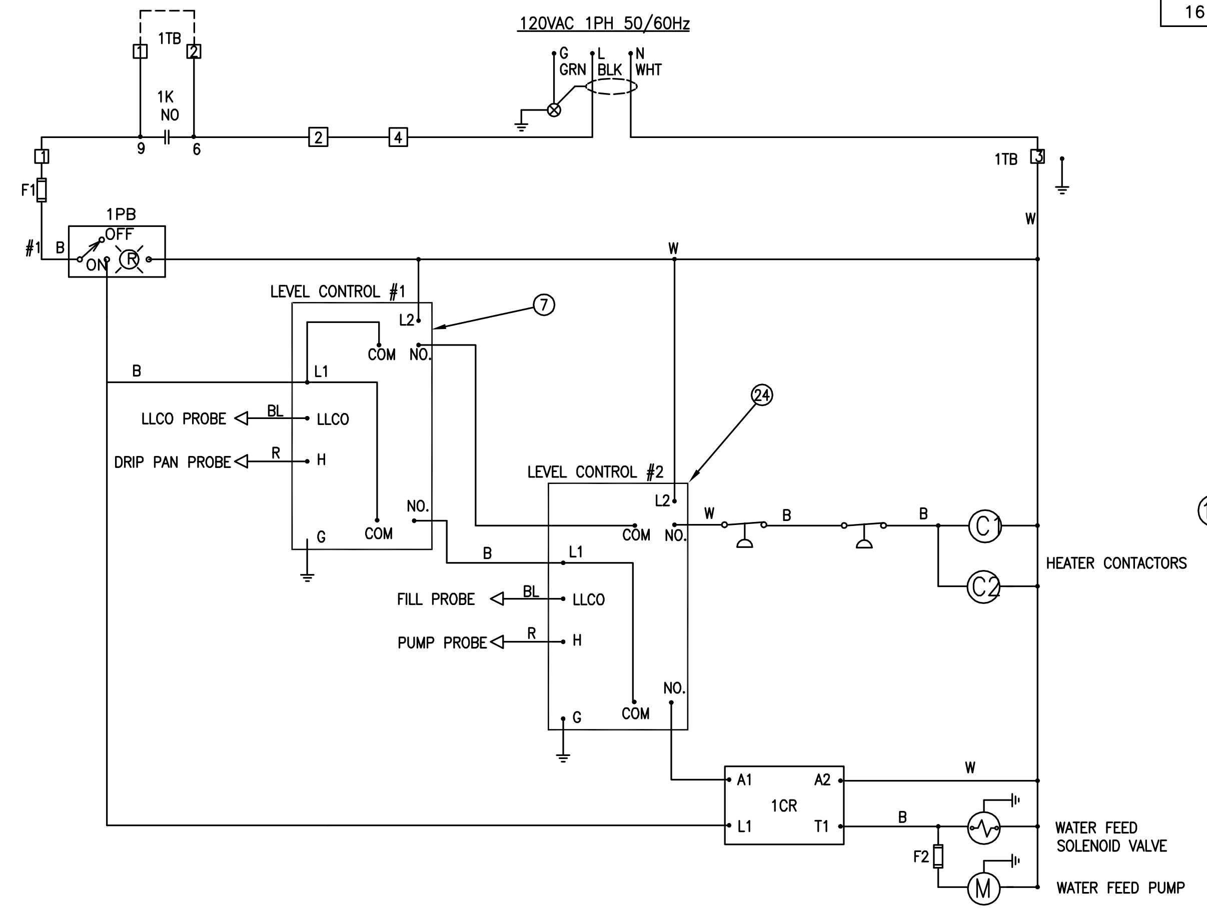
FOR 380V/415V, 480V & 600V ONLY

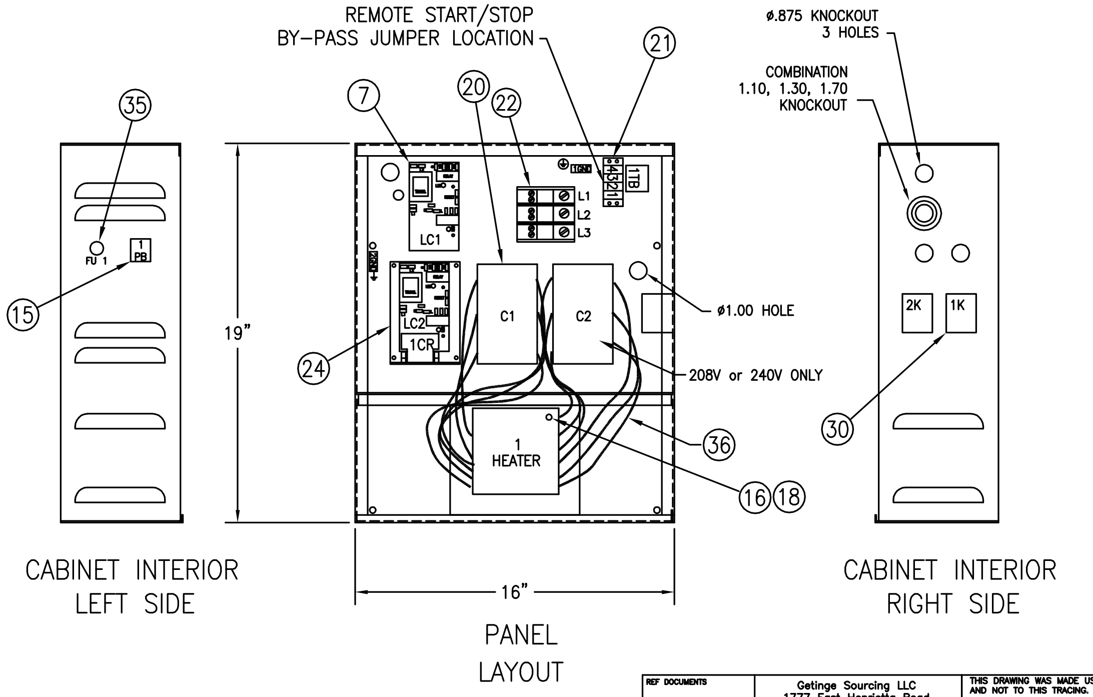
PART NUMBER CROSS REFERENCE FOR REPLACEMENT PARTS ON GTS–30A STEAM GENERATORS

ITEM NUMBER	GETINGE NUMBER	CHROMALOX NUMBER	DESCRIPTION
1	58945	121194136	1/2" NPT STEAM OUTLET VALVE
2	49947	300031001	OPERATING PRESSURE CONTROL
3	49948	300031002	HI LIMIT PRESSURE CONTROL
4	49941	118661001	PRESSURE GAUGE
5	61301607104	118536051	CHECK VALVE
6	61301608522	300579001	FEEDWATER PUMP
7	61301607105	300033044	LOW WATER CUT–OFF CONTROL
8	61301607125	640032002	SIGHT GAUGE GLASS
9	61301607126	120970002	SIGHT VALVE GAUGE
10	61301607205	300032198	SAFETY VALVE, 80 PSI
11	61301607106	118664003	1/4" NPT WATER FEED STRAINER
12	61301607107	121780012	WATER SOLENOID VALVE
13	61301607108	117444002	BOOT, ELECTRODE
15	61301607109	053223002	ON–OFF SWITCH W/ PILOT LIGHT
16	61301607110	300121040	HEATING ELEMENT 208V–3ø, 30KW
16	61301607111	300121010	HEATING ELEMENT 240V–3ø, 30KW
16	61301607112	300121018	HEATING ELEMENT 415V–3ø, 30KW
16	61301607113	300121011	HEATING ELEMENT 480V–3ø, 30KW
16	61301607114	300121031	HEATING ELEMENT 600V–3ø, 30KW

PART NUMBER CROSS REFERENCE FOR REPLACEMENT PARTS ON GTS–30A STEAM GENERATORS

ITEM NUMBER	GETINGE NUMBER	CHROMALOX NUMBER	DESCRIPTION
18	61301607115	072565428	1 SET/HEATING ELEMENT BOLTS 6PCS
20	61301608523	123534077	CONTACTOR, 3 POLE 3ø
21	61301607116	071809012	TERMINAL BLOCK HEATER
22	61301607117	075447001	CONTROL CIRCUIT TERMINAL BLOCK
24	61301607118	300033040	LIQUID LEVEL CONTROL
25	61301607119	300035008	LEVEL PROBE 7"
26	61301607120	300035027	LEVEL PROBE 6 1/2"
27	61301607121	300035028	LEVEL PROBE 5 1/4"
28	61301607122	300035006	LEVEL PROBE SHORT PAN
30	61301601073	121851066	RELAY, 24VAC, DPDT, 25A/1HP
34	61301607123	146012011	HEATING ELEMENT GASKET
35	61301607124	072576027	FUSE, 15A
36	61301607190	640145001	WIRE PKG, CONTACTOR, 12 WIRES
37	61301607191	073301001	FITTING, PRESSURE CONTROL SENSOR
38	61301607192	640145002	WIRE PKG, PROBES


120VAC 1PH 50/60Hz
G GRN
L BLK
N WHT
1TB
1K NO
9
6
2
4
1
2
3
F1
1PB
OFF
ON
R
#1
B
W
LEVEL CONTROL #1
L2
L1
COM
NO.
LLCO PROBE
BL
LLCO
DRIP PAN PROBE
R
H
G
7
24
LEVEL CONTROL #2
FILL PROBE
PUMP PROBE
HEATER CONTACTORS
C1
C2
A1
A2
1CR
L1
T1
F2
WATER FEED SOLENOID VALVE
WATER FEED PUMP
M


REMOTE START/STOP BY–PASS JUMPER LOCATION
ø.875 KNOCKOUT 3 HOLES
COMBINATION 1.10, 1.30, 1.70 KNOCKOUT
35
15
7
20
22
21
24
30
36
16
18
FU 1
1 PB
1TB
L1
L2
L3
LC1
LC2
1CR
C1
C2
1 HEATER
19"
16"
ø1.00 HOLE
208V or 240V ONLY
2K
1K

CABINET INTERIOR LEFT SIDE

PANEL LAYOUT

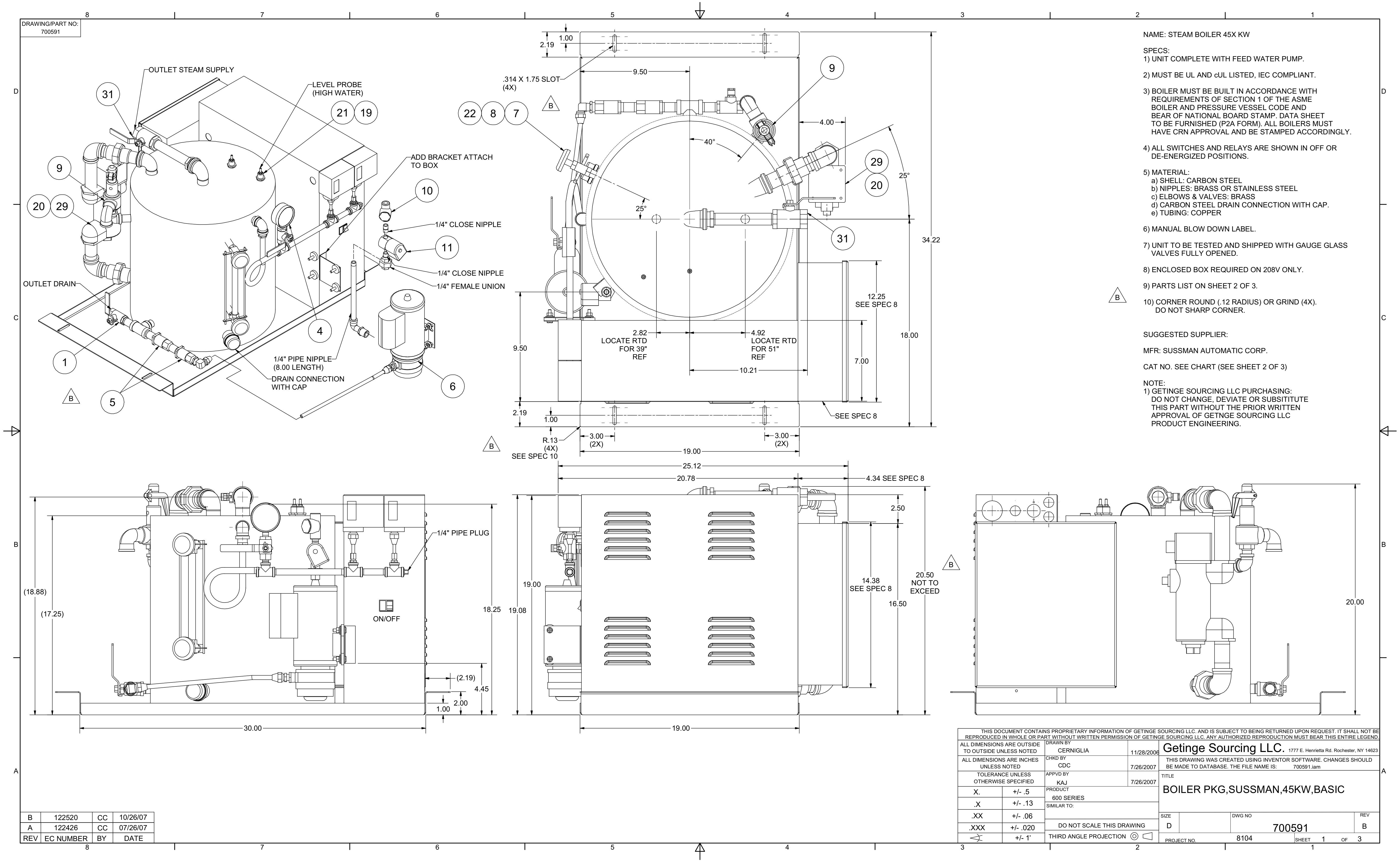
CABINET INTERIOR RIGHT SIDE

SEE SHEET 1 OF 2

LTR	ECO NO.	BY	DATE
REVISIONS			

REF DOCUMENTS	Getinge Sourcing LLC 1777 East Henrietta Road Rochester, NY 14623–3133	THIS DRAWING WAS MADE USING AUTOCAD SOFTWARE. CHANGES SHOULD BE MADE TO DATABASE AND NOT TO THIS TRACING. THE FILENAME IS: 700576D THIS PLOT MADE:12/6/07		
	ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE	DO NOT SCALE THIS DRAWING THIRD ANGLE PROJECTION TOLERANCE UNLESS OTHERWISE SPECIFIED	TITLE GENERATOR, STEAM, CHROMALOX, 30KW, BASIC	
	MATERIAL	2 PLACE DECIMAL	PRODUCT	PROJECT NO.
		3 PLACE DECIMAL	CHK	SIMILAR TO:
SUPERSEDES		ANGLE	APPROVED	SIZE D SHEET 2 OF 2
		SCALE NTS	APPROVED	DRAWING/PART NO. 700576 REV D
	FINISH NONE	DRAWN BY T.LEHMAN	APPROVED	

FIGURE 6–15, SHEET 1. CAS-45A STEAM BOILER


DRAWING/PART NO:
700591
OUTLET STEAM SUPPLY
LEVEL PROBE
(HIGH WATER)
ADD BRACKET ATTACH
TO BOX
1/4" CLOSE NIPPLE
1/4" CLOSE NIPPLE
1/4" FEMALE UNION
OUTLET DRAIN
1/4" PIPE NIPPLE
(8.00 LENGTH)
DRAIN CONNECTION
WITH CAP
31
9
20
29
21
19
10
11
4
1
5
6
22
8
7
B
.314 X 1.75 SLOT
(4X)
2.19
1.00
9.50
40°
25°
25°
4.00
2.82
LOCATE RTD
FOR 39"
REF
4.92
LOCATE RTD
FOR 51"
REF
10.21
12.25
SEE SPEC 8
7.00
18.00
34.22
SEE SPEC 8
R.13
(4X)
SEE SPEC 10
3.00
(2X)
19.00
25.12
20.78
4.34 SEE SPEC 8
2.50
1/4" PIPE PLUG
ON/OFF
(18.88)
(17.25)
18.25
(2.19)
4.45
2.00
1.00
30.00
19.00
19.08
14.38
SEE SPEC 8
16.50
20.50
NOT TO
EXCEED
20.00
8
7
6
5
4
3
2
1
D
C
B
A

NAME: STEAM BOILER 45X KW

SPECS:
1) UNIT COMPLETE WITH FEED WATER PUMP.

2) MUST BE UL AND cUL LISTED, IEC COMPLIANT.

3) BOILER MUST BE BUILT IN ACCORDANCE WITH REQUIREMENTS OF SECTION 1 OF THE ASME BOILER AND PRESSURE VESSEL CODE AND BEAR OF NATIONAL BOARD STAMP. DATA SHEET TO BE FURNISHED (P2A FORM). ALL BOILERS MUST HAVE CRN APPROVAL AND BE STAMPED ACCORDINGLY.

4) ALL SWITCHES AND RELAYS ARE SHOWN IN OFF OR DE-ENERGIZED POSITIONS.

5) MATERIAL:
   a) SHELL: CARBON STEEL
   b) NIPPLES: BRASS OR STAINLESS STEEL
   c) ELBOWS & VALVES: BRASS
   d) CARBON STEEL DRAIN CONNECTION WITH CAP.
   e) TUBING: COPPER

6) MANUAL BLOW DOWN LABEL.

7) UNIT TO BE TESTED AND SHIPPED WITH GAUGE GLASS VALVES FULLY OPENED.

8) ENCLOSED BOX REQUIRED ON 208V ONLY.

9) PARTS LIST ON SHEET 2 OF 3.

B 10) CORNER ROUND (.12 RADIUS) OR GRIND (4X). DO NOT SHARP CORNER.

SUGGESTED SUPPLIER:

MFR: SUSSMAN AUTOMATIC CORP.

CAT NO. SEE CHART (SEE SHEET 2 OF 3)

NOTE:
1) GETINGE SOURCING LLC PURCHASING: DO NOT CHANGE, DEVIATE OR SUBSITITUTE THIS PART WITHOUT THE PRIOR WRITTEN APPROVAL OF GETNGE SOURCING LLC PRODUCT ENGINEERING.

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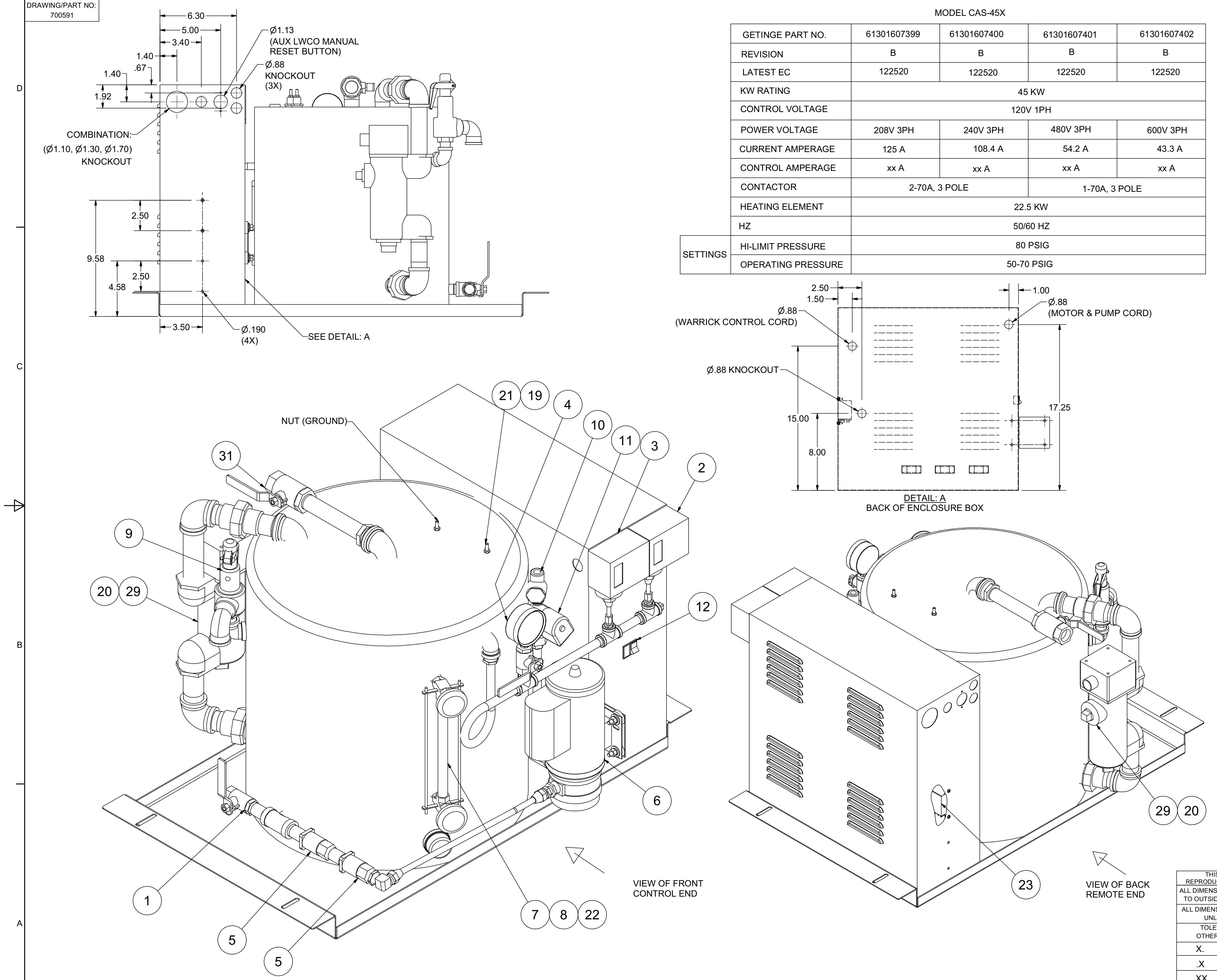
ALL DIMENSIONS ARE INCHES UNLESS NOTED		CHKD BY CDC	7/26/2007	THIS DRAWING WAS CREATED USING INVENTOR SOFTWARE. CHANGES SHOULD BE MADE TO DATABASE. THE FILE NAME IS: 700591.iam
TOLERANCE UNLESS OTHERWISE SPECIFIED		APPVD BY KAJ	7/26/2007	TITLE
X.	+/- .5	PRODUCT 600 SERIES		BOILER PKG,SUSSMAN,45KW,BASIC
.X	+/- .13	SIMILAR TO:		
.XX	+/- .06			SIZE D — DWG NO 700591 — REV B
.XXX	+/- .020	DO NOT SCALE THIS DRAWING		
∠	+/- 1°	THIRD ANGLE PROJECTION		PROJECT NO. 8104 — SHEET 1 OF 3

REV	EC NUMBER	BY	DATE
B	122520	CC	10/26/07
A	122426	CC	07/26/07

FIGURE 6–15, SHEET 2. CAS-45A STEAM BOILER

DRAWING/PART NO:
700591



MODEL CAS-45X

		GETINGE PART NO.	61301607399	61301607400	61301607401	61301607402
	REVISION	B	B	B	B
	LATEST EC	122520	122520	122520	122520
	KW RATING	45 KW			
	CONTROL VOLTAGE	120V 1PH			
	POWER VOLTAGE	208V 3PH	240V 3PH	480V 3PH	600V 3PH
	CURRENT AMPERAGE	125 A	108.4 A	54.2 A	43.3 A
	CONTROL AMPERAGE	xx A	xx A	xx A	xx A
	CONTACTOR	2-70A, 3 POLE		1-70A, 3 POLE	
	HEATING ELEMENT	22.5 KW			
	HZ	50/60 HZ			
SETTINGS	HI-LIMIT PRESSURE	80 PSIG			
	OPERATING PRESSURE	50-70 PSIG			

PART NUMBER CROSS REFERENCE FOR REPLACEMENT PARTS ON
CAS-45X STEAM GENERATORS

ITEM	GETINGE PART NO.	SUSSMAN PART NO.	DESCRIPTION
1	58945	99178	1/2" NPT BALL VALVE BRONZE
2	49947	99128R	OPERATING PRESSURE CONTROL
3	49948	99130R	HI LIMIT PRESSURE CONTROL
4	49941	99197	PRESSURE GAUGE
5	19114	99167	1/2" NPT CHECK VALVE
6	61301607477	103535	MOTOR AND PUMP (FEEDWATER)
7	49958	99074	SIGHT GAUGE GLASS
8	49957	99173C	SIGHT VALVE GAUGE
9	49949	99136	SAFETY VALVE
1	61246	93806A	1/4" NPT STRAINER (WATER FEED)
11	61245	99042	1/4" NPT SOLENOID VALVE
12	49959	92830	ON/OFF SWITCH W/PILOT LIGHT
13*	61301607478	39223B	HEATING ELEMENT 208V/3PH,22.5 KW
13*	61301607479	39223	HEATING ELEMENT 240V/3PH,22.5 KW
13*	61301607480	39223F	HEATING ELEMENT 480V/3PH,22.5 KW
13*	61301607481	39223G	HEATING ELEMENT 600V/3PH,22.5 KW
14*	49944	99547B	1 SET/HEATING ELEMENT BOLTS
15*	61301607482	102206CE	CONTACTOR, 3 POLE 3PH 70A
16*	61301607483	99207S	TERMINAL BLOCK HEATER
17*	49939	99580	CONTROL CIRCUIT TERMINAL BLOCK
18*	49940	90229	SPARK PLUG PROBE (VERTICAL)
19	531033	103163	PROBE BOOT
20		PART OF WARRICK CONTROLS (ITEM 29)	LEVEL PROBE (LOW WATER)
21		PART OF WARRICK CONTROLS (ITEM 29)	LEVEL PROBE (HIGH WATER)
22	517556	L2024	SIGHT GLASS LABEL
23*	61301601073	103456	25A/1HP DPDT 24VAC RELAY
24*	531031	103542	POWER RELAY
25*	531065	99524-6T	CONTRACTOR TO HEATING ELEMENT WIRING
26*	49943	99096	HEATING ELEMENT GASKET
27*	61301608593	99264-6	10A FUSE (LIQUID LEVEL CONTROL)
28*	61301607484	99264-5	5A FUSE (MOTOR AND PUMP)
29	61301607485	103945	WARRICK CONTROLS (SIDE CHAMBER FITTING)
30*	61301607486	99500	FUSE 100A 250V (FOR 208V/3PH ONLY)
31	59804		3/4" NPT BALL VALVE BRONZE
32*	61301608524	103538C	LIQUID LEVEL CONTROL
		(OPTIONAL PACKAGE)	
LWCO	532318	CAS81017MR	LOW - WATER CUT OUT PACKAGE
		ITEMS INSTALLED BY GETINGE FACTORY	
	61301601073	700-HHF62A24	1K RELAY,24VAC, DPDT,25A/1HP
85			

*INSIDE ENCLOSED BOX / SEE WIRING SCHEMATIC/DIAGRAM
SEE SHEET 3 OF 3

SEE SHEET 1 OF 3

REV	EC NUMBER	BY	DATE

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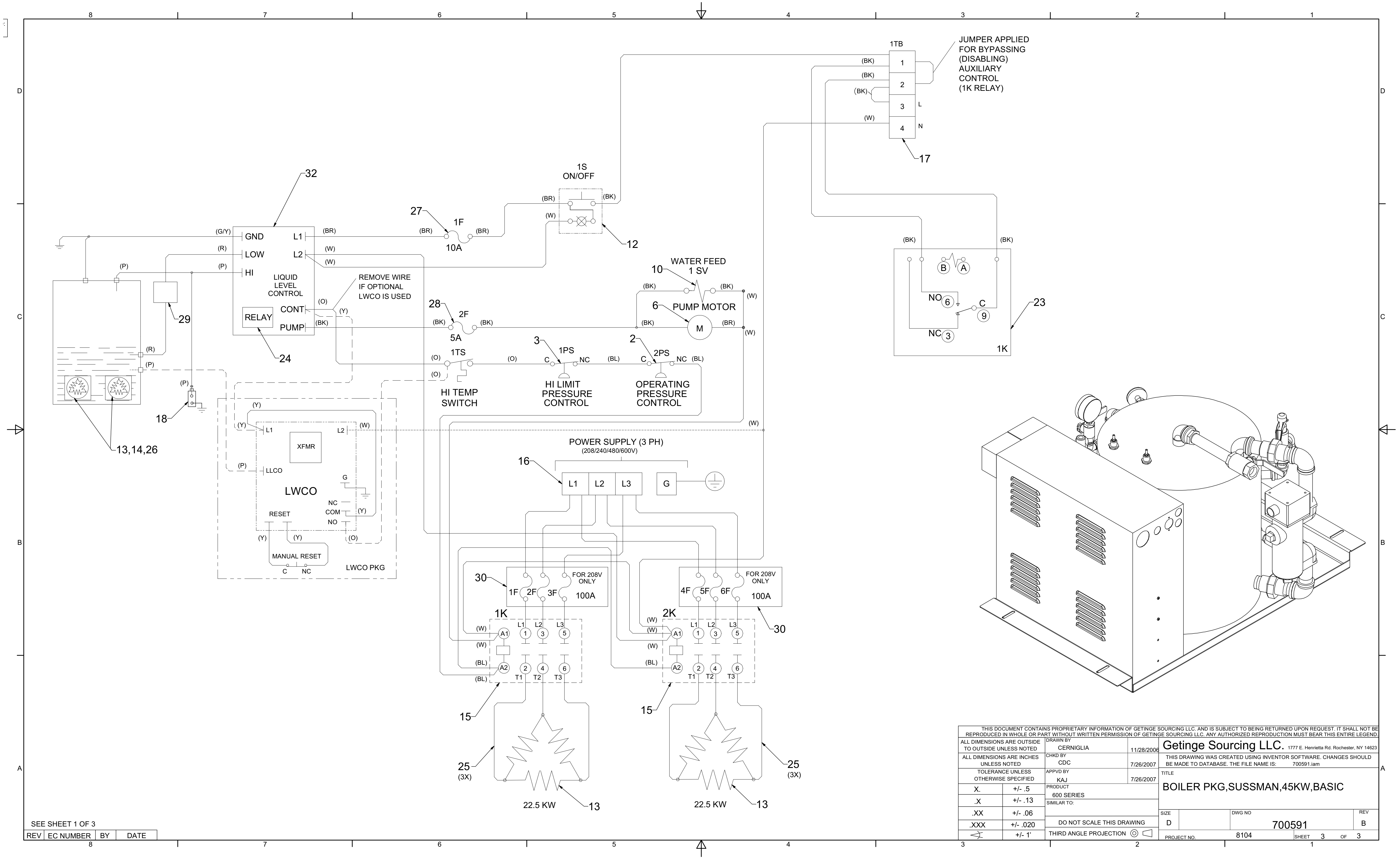
TOLERANCE UNLESS OTHERWISE SPECIFIED		APPVD BY KAJ	7/26/2007	TITLE
X.	+/- .5	PRODUCT 600 SERIES		BOILER PKG,SUSSMAN,45KW,BASIC
.X	+/- .13	SIMILAR TO:		
.XX	+/- .06			SIZE D · DWG NO 700591 · REV B
.XXX	+/- .020	DO NOT SCALE THIS DRAWING		
∢	+/- 1˚	THIRD ANGLE PROJECTION ◎ ⊲		PROJECT NO. 8104 · SHEET 2 OF 3

FIGURE 6–15, SHEET 3. CAS-45A STEAM BOILER


1TB
JUMPER APPLIED FOR BYPASSING (DISABLING) AUXILIARY CONTROL (1K RELAY)
(BK)
(W)
1
2
3
4
L
N
17
1S ON/OFF
(BR)
12
32
GND
LOW
HI
L1
L2
LIQUID LEVEL CONTROL
RELAY
CONT
PUMP
24
(G/Y)
(R)
(P)
27
1F
10A
REMOVE WIRE IF OPTIONAL LWCO IS USED
(O)
(Y)
10
WATER FEED 1 SV
6
PUMP MOTOR
M
28
2F
5A
3
1PS
2
2PS
C
NC
1TS
HI TEMP SWITCH
HI LIMIT PRESSURE CONTROL
OPERATING PRESSURE CONTROL
(BL)
23
B
A
NO
C
NC
6
9
3
1K
29
18
13,14,26
L1
L2
XFMR
LLCO
LWCO
G
NC
COM
NO
RESET
MANUAL RESET
C
NC
LWCO PKG
POWER SUPPLY (3 PH)
(208/240/480/600V)
16
L1
L2
L3
G
30
1F
2F
3F
4F
5F
6F
FOR 208V ONLY
100A
1K
2K
A1
A2
L1
L2
L3
T1
T2
T3
1
2
3
4
5
6
15
25
(3X)
22.5 KW
13
SEE SHEET 1 OF 3
REV
EC NUMBER
BY
DATE
8
7
6
5
4
3
2
1
D
C
B
A

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ALL DIMENSIONS ARE OUTSIDE TO OUTSIDE UNLESS NOTED

ALL DIMENSIONS ARE INCHES UNLESS NOTED

TOLERANCE UNLESS OTHERWISE SPECIFIED

X.	+/- .5
.X	+/- .13
.XX	+/- .06
.XXX	+/- .020
∠	+/- 1'

DRAWN BY	CERNIGLIA	11/28/2006
CHKD BY	CDC	7/26/2007
APPVD BY	KAJ	7/26/2007
PRODUCT	600 SERIES	
SIMILAR TO:		

DO NOT SCALE THIS DRAWING

THIRD ANGLE PROJECTION

Getinge Sourcing LLC. 1777 E. Henrietta Rd. Rochester, NY 14623

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TITLE
BOILER PKG,SUSSMAN,45KW,BASIC

SIZE	DWG NO	REV
D	700591	B

PROJECT NO. 8104 SHEET 3 OF 3

FIGURE 6–16. MP-129F WATER-SAVER WIRING DIAGRAM

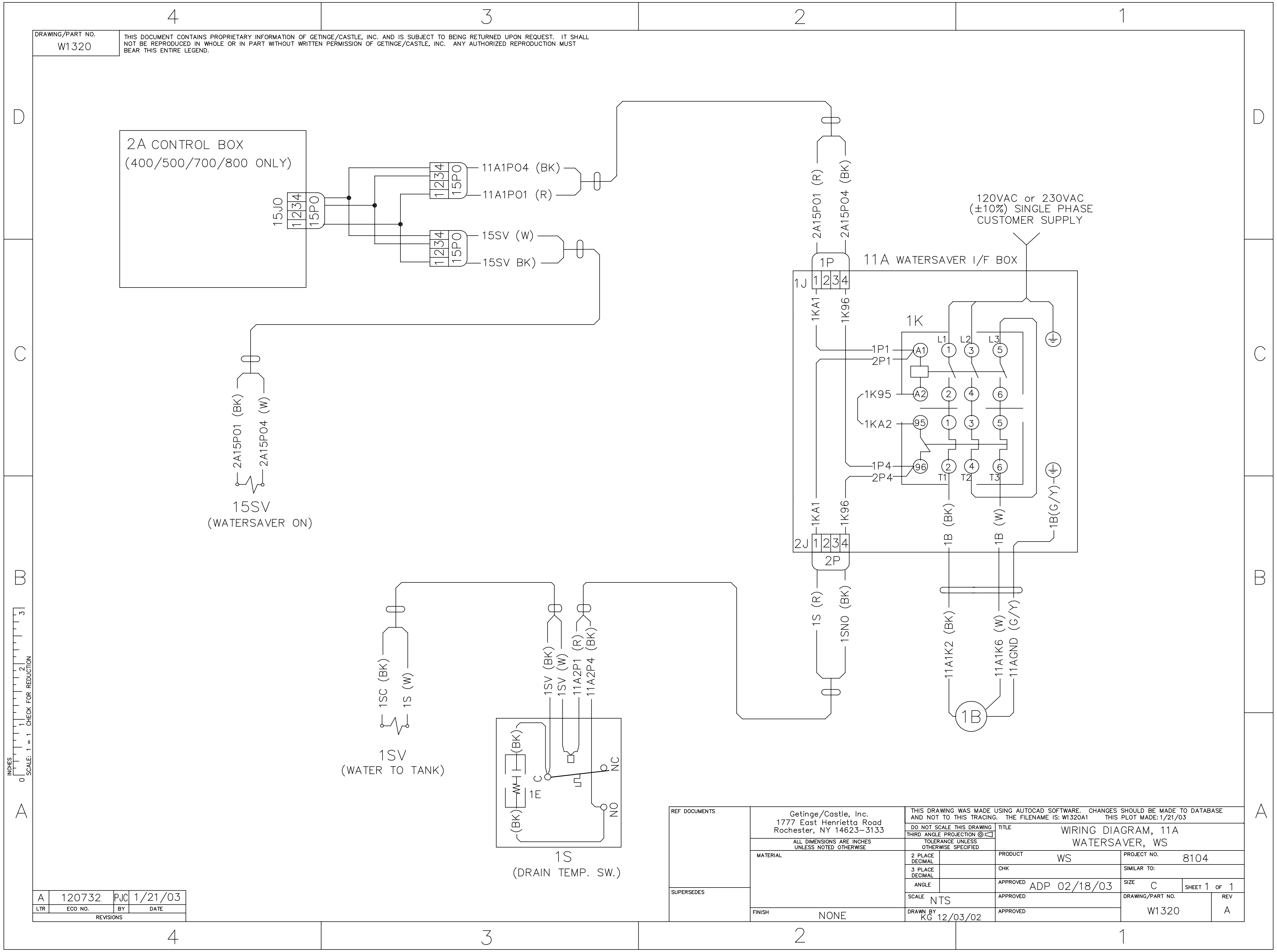
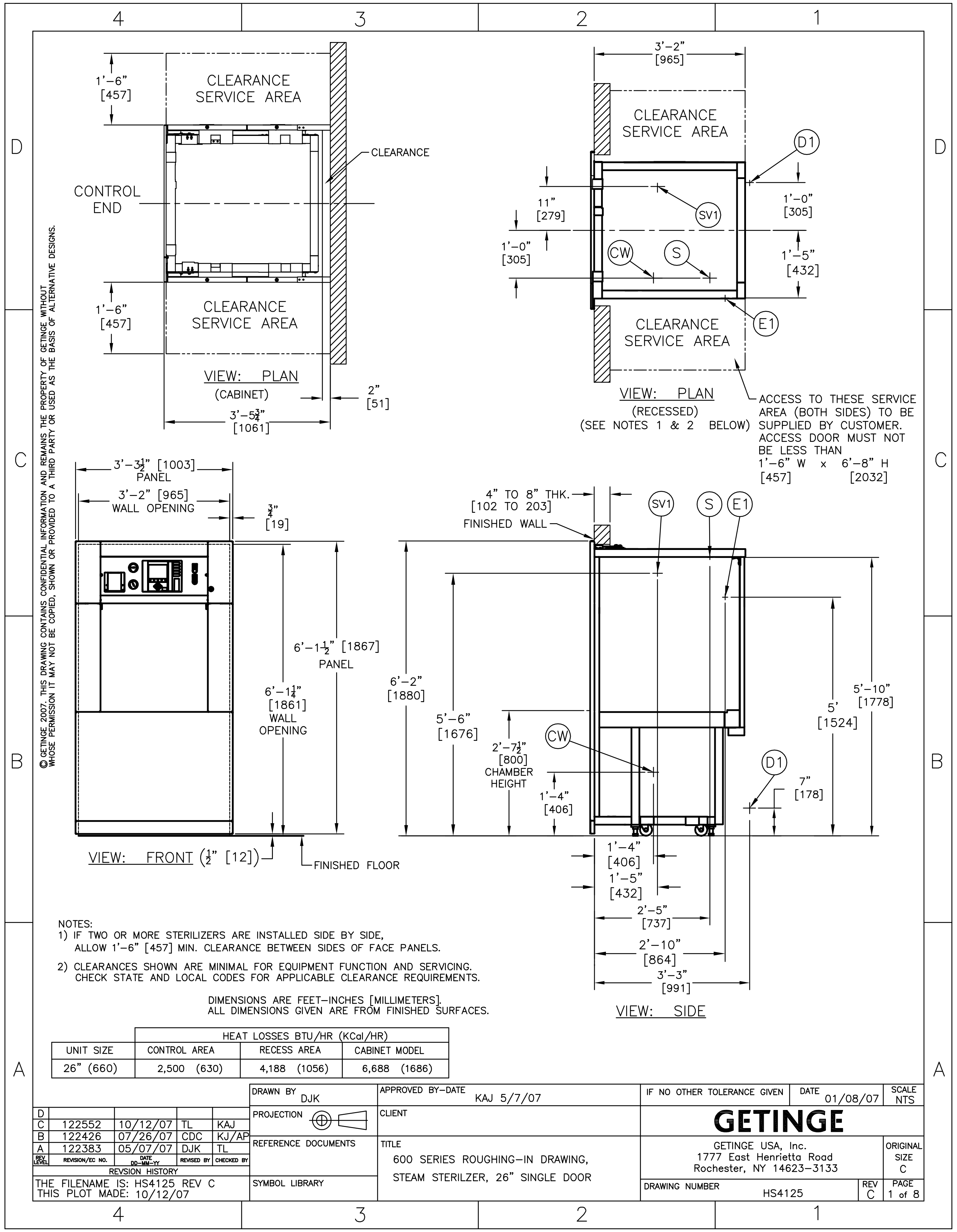

DRAWING/PART NO.
W1320
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GETINGE/CASTLE, INC. AND IS SUBJECT TO BEING RETURNED UPON REQUEST. IT SHALL NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION OF GETINGE/CASTLE, INC. ANY AUTHORIZED REPRODUCTION MUST BEAR THIS ENTIRE LEGEND.
2A CONTROL BOX
(400/500/700/800 ONLY)
15JO
15PO
1234
11A1PO4 (BK)
11A1PO1 (R)
15SV (W)
15SV BK)
2A15PO1 (BK)
2A15PO4 (W)
15SV
(WATERSAVER ON)
2A15PO1 (R)
2A15PO4 (BK)
120VAC or 230VAC
(±10%) SINGLE PHASE
CUSTOMER SUPPLY
1P
11A WATERSAVER I/F BOX
1J
1KA1
1K96
1K
L1
L2
L3
1P1
2P1
A1
A2
1K95
1KA2
95
96
1P4
2P4
T1
T2
T3
1B (BK)
1B (W)
1B(G/Y)
2J
2P
1S (R)
1SNO (BK)
11A1K2 (BK)
11A1K6 (W)
11AGND (G/Y)
1B
1SC (BK)
1S (W)
1SV
(WATER TO TANK)
1SV (BK)
1SV (W)
11A2P1 (R)
11A2P4 (BK)
(BK)
C
1E
(BK)
NC
NO
1S
(DRAIN TEMP. SW.)
INCHES
SCALE: 1 = 1 CHECK FOR REDUCTION
A 120732 PJC 1/21/03
LTR ECO NO. BY DATE
REVISIONS
REF DOCUMENTS
SUPERSEDES
Getinge/Castle, Inc.
1777 East Henrietta Road
Rochester, NY 14623–3133
ALL DIMENSIONS ARE INCHES UNLESS NOTED OTHERWISE
MATERIAL
FINISH NONE
THIS DRAWING WAS MADE USING AUTOCAD SOFTWARE. CHANGES SHOULD BE MADE TO DATABASE AND NOT TO THIS TRACING. THE FILENAME IS: W1320A1 THIS PLOT MADE: 1/21/03
DO NOT SCALE THIS DRAWING
THIRD ANGLE PROJECTION
TOLERANCE UNLESS OTHERWISE SPECIFIED
2 PLACE DECIMAL
3 PLACE DECIMAL
ANGLE
SCALE NTS
DRAWN BY KG 12/03/02
TITLE WIRING DIAGRAM, 11A WATERSAVER, WS
PRODUCT WS
PROJECT NO. 8104
CHK
SIMILAR TO:
APPROVED ADP 02/18/03
SIZE C
SHEET 1 OF 1
APPROVED
APPROVED
DRAWING/PART NO. W1320
REV A

FIGURE 6–17, SHEET 1. ROUGHING-IN DRAWING


CLEARANCE SERVICE AREA
1'–6" [457]
CLEARANCE
CONTROL END
VIEW: PLAN (CABINET)
3'–5¾" [1061]
2" [51]
3'–2" [965]
D1
SV1
CW
S
E1
11" [279]
1'–0" [305]
1'–5" [432]
VIEW: PLAN (RECESSED) (SEE NOTES 1 & 2 BELOW)
ACCESS TO THESE SERVICE AREA (BOTH SIDES) TO BE SUPPLIED BY CUSTOMER. ACCESS DOOR MUST NOT BE LESS THAN 1'–6" W x 6'–8" H [457] [2032]
3'–3½" [1003] PANEL
3'–2" [965] WALL OPENING
¾" [19]
6'–1½" [1867] PANEL
6'–1¼" [1861] WALL OPENING
VIEW: FRONT (½" [12])
FINISHED FLOOR
4" TO 8" THK. [102 TO 203] FINISHED WALL
6'–2" [1880]
5'–6" [1676]
2'–7½" [800] CHAMBER HEIGHT
1'–4" [406]
5' [1524]
5'–10" [1778]
7" [178]
1'–4" [406]
1'–5" [432]
2'–5" [737]
2'–10" [864]
3'–3" [991]
VIEW: SIDE
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NOTES:
1) IF TWO OR MORE STERILIZERS ARE INSTALLED SIDE BY SIDE,
ALLOW 1'–6" [457] MIN. CLEARANCE BETWEEN SIDES OF FACE PANELS.

2) CLEARANCES SHOWN ARE MINIMAL FOR EQUIPMENT FUNCTION AND SERVICING.
CHECK STATE AND LOCAL CODES FOR APPLICABLE CLEARANCE REQUIREMENTS.

DIMENSIONS ARE FEET–INCHES [MILLIMETERS].
ALL DIMENSIONS GIVEN ARE FROM FINISHED SURFACES.

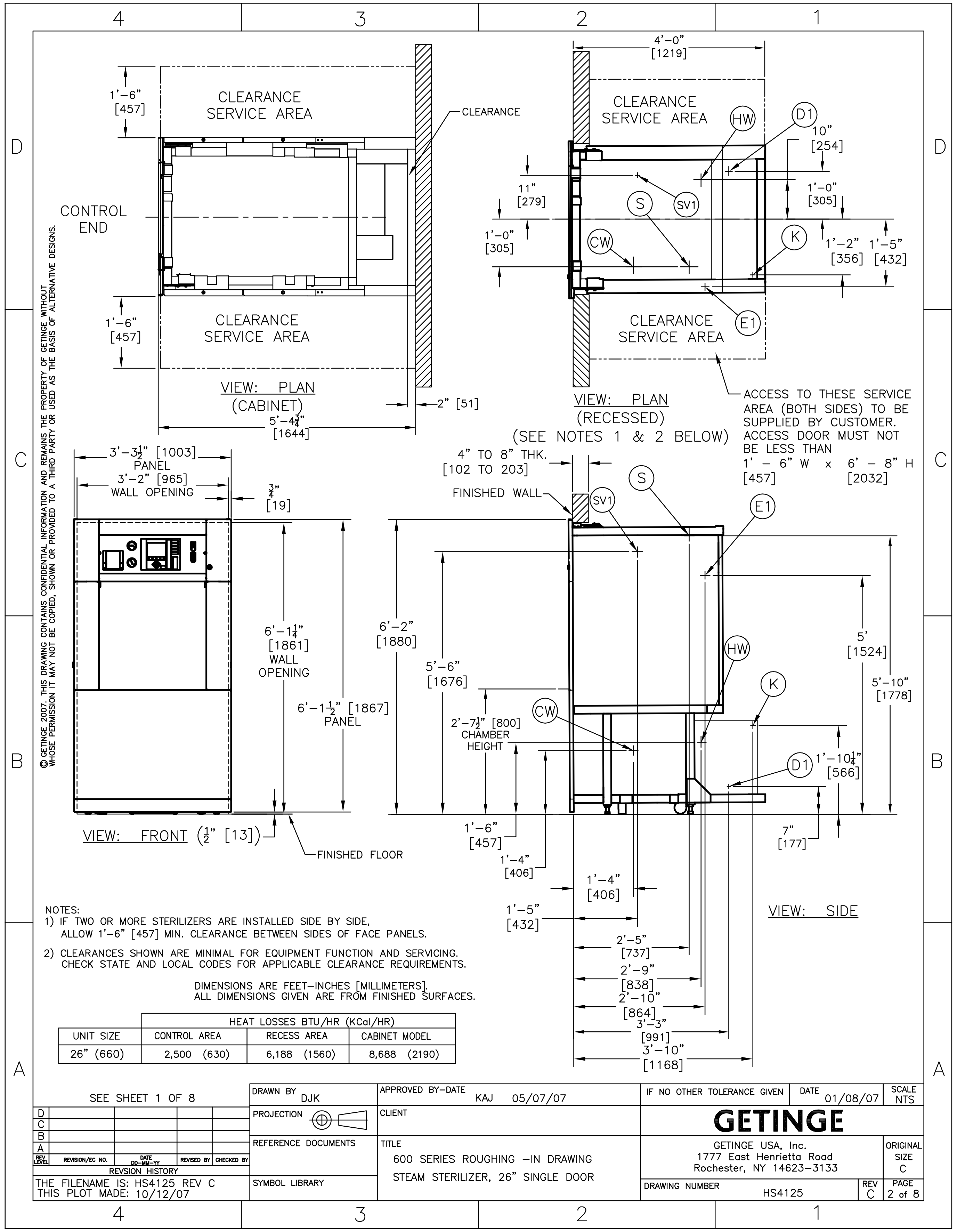
	HEAT LOSSES BTU/HR (KCal/HR)		
UNIT SIZE	CONTROL AREA	RECESS AREA	CABINET MODEL
26" (660)	2,500 (630)	4,188 (1056)	6,688 (1686)

REV LEVEL	REVISION/EC NO.	DATE DD–MM–YY	REVISED BY	CHECKED BY
D				
C	122552	10/12/07	TL	KAJ
B	122426	07/26/07	CDC	KJ/AP
A	122383	05/07/07	DJK	TL

REVSION HISTORY

THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07

DRAWN BY DJK
APPROVED BY–DATE KAJ 5/7/07
IF NO OTHER TOLERANCE GIVEN
DATE 01/08/07
SCALE NTS
PROJECTION
CLIENT
GETINGE
REFERENCE DOCUMENTS
TITLE
600 SERIES ROUGHING–IN DRAWING,
STEAM STERILZER, 26" SINGLE DOOR
GETINGE USA, Inc.
1777 East Henrietta Road
Rochester, NY 14623–3133
ORIGINAL SIZE C
SYMBOL LIBRARY
DRAWING NUMBER HS4125
REV C
PAGE 1 of 8


CLEARANCE SERVICE AREA
1'–6" [457]
CLEARANCE
CONTROL END
VIEW: PLAN (CABINET)
5'–4¾" [1644]
2" [51]
4'–0" [1219]
HW
D1
S
SV1
CW
K
E1
10" [254]
11" [279]
1'–0" [305]
1'–2" [356]
1'–5" [432]
VIEW: PLAN (RECESSED)
(SEE NOTES 1 & 2 BELOW)
ACCESS TO THESE SERVICE AREA (BOTH SIDES) TO BE SUPPLIED BY CUSTOMER. ACCESS DOOR MUST NOT BE LESS THAN 1' – 6" W x 6' – 8" H [457] [2032]
3'–3½" [1003] PANEL
3'–2" [965] WALL OPENING
¾" [19]
6'–1¼" [1861] WALL OPENING
6'–1½" [1867] PANEL
VIEW: FRONT (½" [13])
FINISHED FLOOR
4" TO 8" THK. [102 TO 203] FINISHED WALL
6'–2" [1880]
5'–6" [1676]
2'–7½" [800] CHAMBER HEIGHT
1'–6" [457]
1'–4" [406]
5' [1524]
5'–10" [1778]
1'–10¼" [566]
7" [177]
1'–4" [406]
1'–5" [432]
2'–5" [737]
2'–9" [838]
2'–10" [864]
3'–3" [991]
3'–10" [1168]
VIEW: SIDE
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NOTES:
1) IF TWO OR MORE STERILIZERS ARE INSTALLED SIDE BY SIDE,
ALLOW 1'–6" [457] MIN. CLEARANCE BETWEEN SIDES OF FACE PANELS.

2) CLEARANCES SHOWN ARE MINIMAL FOR EQUIPMENT FUNCTION AND SERVICING.
CHECK STATE AND LOCAL CODES FOR APPLICABLE CLEARANCE REQUIREMENTS.

DIMENSIONS ARE FEET–INCHES [MILLIMETERS].
ALL DIMENSIONS GIVEN ARE FROM FINISHED SURFACES.

	HEAT LOSSES BTU/HR (KCal/HR)		
UNIT SIZE	CONTROL AREA	RECESS AREA	CABINET MODEL
26" (660)	2,500 (630)	6,188 (1560)	8,688 (2190)

SEE SHEET 1 OF 8

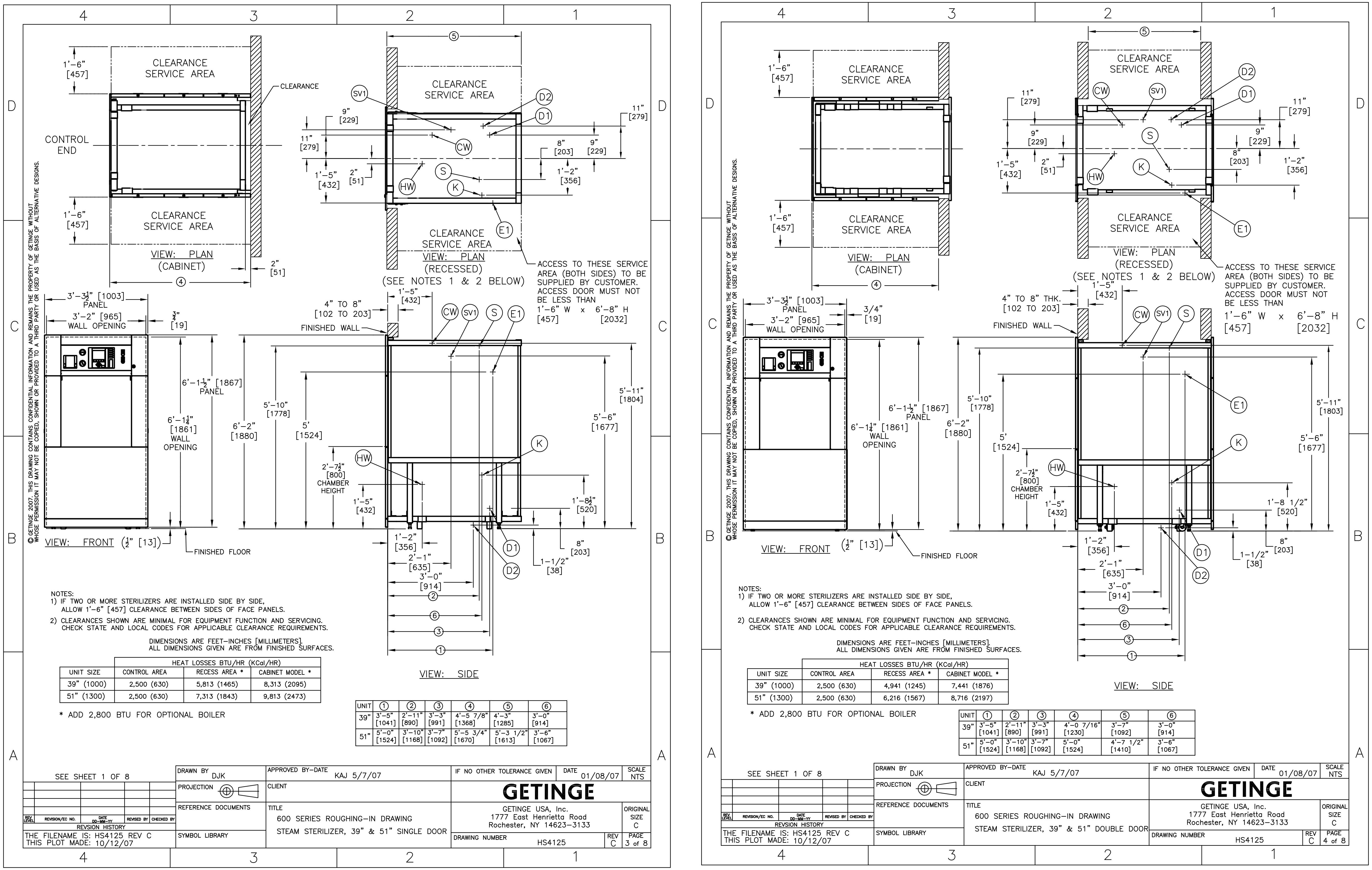
REV LEVEL	REVISION/EC NO.	DATE DD–MM–YY	REVISED BY	CHECKED BY
D				
C				
B				
A				

REVSION HISTORY

THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07

DRAWN BY DJK
APPROVED BY–DATE KAJ 05/07/07
IF NO OTHER TOLERANCE GIVEN
DATE 01/08/07
SCALE NTS
PROJECTION
CLIENT
GETINGE
REFERENCE DOCUMENTS
TITLE
600 SERIES ROUGHING –IN DRAWING
STEAM STERILIZER, 26" SINGLE DOOR
GETINGE USA, Inc.
1777 East Henrietta Road
Rochester, NY 14623–3133
ORIGINAL SIZE C
SYMBOL LIBRARY
DRAWING NUMBER HS4125
REV C
PAGE 2 of 8

FIGURE 6–17, SHEET 2. ROUGHING-IN DRAWING


4
3
2
1
D
C
B
A
CLEARANCE SERVICE AREA
CLEARANCE
CONTROL END
VIEW: PLAN (CABINET)
VIEW: PLAN (RECESSED)
(SEE NOTES 1 & 2 BELOW)
ACCESS TO THESE SERVICE AREA (BOTH SIDES) TO BE SUPPLIED BY CUSTOMER. ACCESS DOOR MUST NOT BE LESS THAN
1'-6" W x 6'-8" H
[457] [2032]
SV1
CW
D1
D2
S
K
HW
E1
1'-6" [457]
2" [51]
9" [229]
11" [279]
1'-5" [432]
8" [203]
1'-2" [356]
3'-3½" [1003] PANEL
3'-2" [965] WALL OPENING
¾" [19]
6'-1½" [1867] PANEL
6'-1¼" [1861] WALL OPENING
6'-2" [1880]
5'-10" [1778]
5' [1524]
4" TO 8" [102 TO 203]
4" TO 8" THK. [102 TO 203]
FINISHED WALL
5'-11" [1804]
5'-11" [1803]
5'-6" [1677]
2'-7½" [800] CHAMBER HEIGHT
1'-8½" [520]
1'-8 1/2" [520]
1-1/2" [38]
2'-1" [635]
3'-0" [914]
VIEW: FRONT (½" [13])
FINISHED FLOOR
VIEW: SIDE
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SEE SHEET 1 OF 8
REV LEVEL
REVISION/EC NO.
DATE DD-MM-YY
REVISED BY
CHECKED BY
REVISION HISTORY
DRAWN BY DJK
APPROVED BY-DATE KAJ 5/7/07
IF NO OTHER TOLERANCE GIVEN
DATE 01/08/07
SCALE NTS
PROJECTION
CLIENT
REFERENCE DOCUMENTS
SYMBOL LIBRARY
GETINGE
GETINGE USA, Inc.
1777 East Henrietta Road
Rochester, NY 14623-3133
ORIGINAL SIZE C
DRAWING NUMBER HS4125
REV C

Sheet 3 of 8 — TITLE: 600 SERIES ROUGHING-IN DRAWING, STEAM STERILIZER, 39" & 51" SINGLE DOOR

THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07
PAGE 3 of 8

NOTES:
1) IF TWO OR MORE STERILIZERS ARE INSTALLED SIDE BY SIDE, ALLOW 1'-6" [457] CLEARANCE BETWEEN SIDES OF FACE PANELS.
2) CLEARANCES SHOWN ARE MINIMAL FOR EQUIPMENT FUNCTION AND SERVICING. CHECK STATE AND LOCAL CODES FOR APPLICABLE CLEARANCE REQUIREMENTS.

DIMENSIONS ARE FEET-INCHES [MILLIMETERS].
ALL DIMENSIONS GIVEN ARE FROM FINISHED SURFACES.

	HEAT LOSSES BTU/HR (KCal/HR)		
UNIT SIZE	CONTROL AREA	RECESS AREA *	CABINET MODEL *
39" (1000)	2,500 (630)	5,813 (1465)	8,313 (2095)
51" (1300)	2,500 (630)	7,313 (1843)	9,813 (2473)

* ADD 2,800 BTU FOR OPTIONAL BOILER

UNIT	①	②	③	④	⑤	⑥
39"	3'-5" [1041]	2'-11" [890]	3'-3" [991]	4'-5 7/8" [1368]	4'-3" [1285]	3'-0" [914]
51"	5'-0" [1524]	3'-10" [1168]	3'-7" [1092]	5'-5 3/4" [1670]	5'-3 1/2" [1613]	3'-6" [1067]

Sheet 4 of 8 — TITLE: 600 SERIES ROUGHING-IN DRAWING, STEAM STERILIZER, 39" & 51" DOUBLE DOOR

THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07
PAGE 4 of 8

NOTES:
1) IF TWO OR MORE STERILIZERS ARE INSTALLED SIDE BY SIDE, ALLOW 1'-6" [457] CLEARANCE BETWEEN SIDES OF FACE PANELS.
2) CLEARANCES SHOWN ARE MINIMAL FOR EQUIPMENT FUNCTION AND SERVICING. CHECK STATE AND LOCAL CODES FOR APPLICABLE CLEARANCE REQUIREMENTS.

DIMENSIONS ARE FEET-INCHES [MILLIMETERS].
ALL DIMENSIONS GIVEN ARE FROM FINISHED SURFACES.

	HEAT LOSSES BTU/HR (KCal/HR)		
UNIT SIZE	CONTROL AREA	RECESS AREA *	CABINET MODEL *
39" (1000)	2,500 (630)	4,941 (1245)	7,441 (1876)
51" (1300)	2,500 (630)	6,216 (1567)	8,716 (2197)

* ADD 2,800 BTU FOR OPTIONAL BOILER

UNIT	①	②	③	④	⑤	⑥
39"	3'-5" [1041]	2'-11" [890]	3'-3" [991]	4'-0 7/16" [1230]	3'-7" [1092]	3'-0" [914]
51"	5'-0" [1524]	3'-10" [1168]	3'-7" [1092]	5'-0" [1524]	4'-7 1/2" [1410]	3'-6" [1067]

FIGURE 6–17, SHEET 3. ROUGHING-IN DRAWING

NOTICE: Work by others

Safe and efficient operation of this product is dependent upon the owner/user providing the services specified herein as well as any other normally accepted electrical, mechanical or plumbing interface between user's supply and this product. Getinge USA will not assume responsibility for problems that result from non–compliance with the above conditions. The following conditions and services are required by Getinge USA equipment and are to be provided by others.

TABLE A: PLUMBING CONNECTIONS & UTILITIES

(Refer to notes 1–6 on sheet 6)

ON UNIT CONNECTION	PIPE SIZE TO UNIT	PRESSURE RANGE DYNAMIC AT UNIT	FLOW RATE MAX
S = Steam 3/4" [19] NPT FEMALE SEE NOTE 4	1" [25] NPT	50–70 psig (3.5–4.9 kg/cm²)	200 lbs./Hr (91 kg/Hr)
CW = Cold water 3/4" [19] NPT FEMALE or FOR WATER BOOSTER PUMP 1 1/4" [32] NPT FEMALE SEE NOTE 1	1" [25] NPT BOOSTER PUMP 1 1/2" [38] NPT	40–70 psig (2.8–4.9 kg/cm²)	11 gpm (2.5 m³/Hr)
D1 = Drain 1 1/2" [38] ODT	SEE NOTE 3	Not applicable	SEE NOTE 3
HW = Hot water (BOILER UNIT ONLY) 1/4" [6] NPT FEMALE SEE NOTE 2	1/2"[13] NPT	20–50 psig (1.4–3.5 kg/cm²)	0.6 gpm (.14 m³/Hr)
SV1 = Sterilizer (Jacket) pressure relief valve vent 3/4" [19] NPT FEMALE	SEE NOTE 5	Not applicable	SEE NOTE 5
SV3 = Steam Generator (BOILER UNIT ONLY) pressure relief valve vent 1" [25] NPT FEMALE	SEE NOTE 5	Not applicable	SEE NOTE 5
D2 = Boiler Drain/Blowdown (BOILER UNIT ONLY) 1/2" [13] NPT FEMALE	SEE NOTE 10	Not applicable	SEE NOTE 10

TABLE B: ELECTRICAL CONNECTIONS & UTILITIES

(Refer to note 7 on sheet 6)

SERVICE	CONDUIT SIZE	UTILITY NOMINAL VOLTAGE	UTILITY VOLTAGE RANGE	MAX. CURRENT NOMINAL VOLTAGE	Breaker/Fusing Recommended
E1= Power Box	1/2" [13]	115V, 50/60 Hz, 1~	+/– 10%	12 A	15 A
OPTIONAL – connections required for optional equipment listed below					
E2= Integral Transformer Box	1/2" [13]	230V, 50/60Hz, 1~	+/– 10%	5 A	15 A
For 26" long sterilizer chamber with 30KW Integral Steam Generator: K= Electric 4 WIRE WITH GROUND	1 1/4" [32]	208V, 50/60Hz, 3~	188 – 216V	84 A	100 A
	1" [25]	240V, 50/60Hz, 3~	217 – 250V	73 A	100 A
	3/4" [19]	480V, 60Hz, 3~	432 – 500V	36 A	50 A
	3/4" [19]	600V, 60Hz, 3~	540 – 625V	29 A	40 A
For 39" or 51" long sterilizer chamber with 45KW Integral Steam Generator: K= Electric 4 WIRE WITH GROUND	2" [51]	208V, 50/60Hz, 3~	188 – 216V	125 A	150 A
	1 1/2" [38]	240V, 50/60Hz, 3~	217 – 250V	108 A	125 A
	3/4" [19]	480V, 60Hz, 3~	432 – 500V	54 A	60 A
	1/2" [13]	600V, 60Hz, 3~	540 – 625V	43 A	60 A

OPERATING ENVIRONMENTAL CONDITIONS

Temperature:	50° – 104°F (10° – 40°C)
Relative Humidity:	10% – 90% non–condensing
Atmospheric Pressure:	0–6500 feet (0–2000 meters) elevation, (Special software needed for higher elevations)

Pollution Degree: 2

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SEE SHEET 1 OF 8

REV LEVEL	REVISION/EC NO.	DATE DD–MM–YY	REVISED BY	CHECKED BY

REVSION HISTORY

THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07

DRAWN BY DJK
APPROVED BY–DATE KAJ 5/7/07
IF NO OTHER TOLERANCE GIVEN
DATE 01/11/07
SCALE NTS
PROJECTION
CLIENT
GETINGE
REFERENCE DOCUMENTS
TITLE
600 SERIES ROUGHING–IN DRAWING
TABLES DOCUMENT
GETINGE USA, Inc.
1777 East Henrietta Road
Rochester, NY 14623–3133
ORIGINAL SIZE C
SYMBOL LIBRARY
DRAWING NUMBER HS4125
REV C
PAGE 5 of 8

NOTES TO ARCHITECTS & CONTRACTORS

1) Cold water:
   - a) Cold water quality: Use potable water with a hardness of 0.5–10 grains/gal [8–170 ppm].
   - b) Maximum temperature requirement is 80°F [27°C]. Optimal vacuum efficiency is at or below 70°F [21°C], 60°F [16°C] for optional LS vacuum pump.
   - c) Back–syphonage protection is required by others. Check local plumbing code and install backflow preventer. (Examples: Vacuum breaker, dual–check or reduced pressure type).
   - d) An optional water booster pump is available (See sheet 5 for pipe connection sizes):
     - * For installations where water pressure is at least 20 psig [1.4 kg/cm²] dynamic but less than 35 psig [2.8 kg/cm²].
     - * To achieve satisfactory performance with dense loads where dynamic pressure is at or below 35 psig [2.8 kg/cm²].
     - * if required backflow preventer lowers the water pressure below the minimum specified.
     - * The optional booster pump requires mechanical electrical and plumbing hook–up by customer. A separate electrical service to the water booster pump junction box is necessary. Contact your local Getinge USA representative for Utility Data
2) Hot water to be supplied only when integral steam boiler is selected.
   - a) Water quality information: For optimum results, the feed water supply should be tested prior to initial startup. If the mineral content exceeds the following recommended limits, various external treatment processes (water softener, RO, etc.) may be used to correct the problem. Routine manual blow–down or automatic blow–down option lowers concentrations of impurities and maintains the pH level above 7.0.
   - b) Feedwater quality:

HARDNESS	0.5–5.0 GRAINS/GALLON [8–85 PPM]
RESISTIVITY	NOT TO EXCEED 50 KOHMS/CM
TEMPERATURE	100°F – 150°F [38°C – 65°C]
TOTAL DISSOLVED SOLIDS	150 PPM MAX.
pH	6.8–7.5

3) It shall be the customer's responsibility to provide a proper drainage system in accordance with applicable local codes. Temperature of drain water will not exceed 140°F [60°C] under normal operating conditions. If cold water supply is cut–off, temperature may exceed 200°F [93°C].
4) For units without an integral steam generator, It shall be the customer's responsibility to provide condensate free steam between 97% and 100% saturated vapor.
5) Getinge USA recommends piping all vessel pressure relief valves to a vented manifold outside the equipment service area. Caution must be exercised not to reduce the discharge capacity of the relief valve. Recommended piping practices for relief valve piping can be found in ASME Boiler and Pressure Vessel Code Section VIII, Div. 1, UG–135. Check local codes for special requirements.
6) All customer connections to sterilizer must be labeled. For safety, all shutoff valves must be reachable when standing on the floor at the equipment (i.e. water, steam, compressed air).
7) Electrical Supply
   - a) It shall be the customer's responsibility to complete all electrical connections in accordance with the National Electrical Code and all applicable local codes.
   - b) A dedicated, permanently connected electrical supply with conveniently accessible disconnect switch (supplied by customer) is required for each sterilizer service indicated in Table B. Where both single phase and 3 phase supply is required, two disconnect switches can be used, yet shall be properly labeled and located as close as possible to each other and the sterilizer. Refer to the Getinge USA Installation Manual for specific instructions.
   - c) For standard 115VAC units, 115VAC supply is required at "E1". For units with the optional 230V to 115V step–down transformer (integral with sterilizer), 230VAC supply is required at "E2" (and no connection at "E1").
   - d) For voltages other than 115V or 230V, a separate universal transformer is available to provide 115VAC to "E1" with input voltage configurable to 100, 200/208, 380/400/415, or 440/460/480. It shall be the customer's responsibility to install the universal transformer. Transformer box dimensions: 10"L x 7 1/4" W x 5 3/8" D [254 x 184 x137].
8) Double Door units, recessed into two walls, require partial dis–assembly of unit to allow installation into fixed walls.
9) Shipment and Building Access.

Required Door Access – Free and Clear	Width	Height
a) On skid/completely assembled	45"	80"
b) Off skid/completely assembled	40"	75"
c) Off skid/some paneling removed at extra cost – Requires casters	35"	73"

10) D2 is a Drain/Blowdown connection required on 39" and 51" units equipped with the integral 45kw steam boiler. The piping from this connection point is to be supplied by customer. 1/2" ID minimum pipe (to enable required discharge), 100 psig working pressure 300°F [149°C] capable. The D2 connection point requires connection to a a separator tank (supplied by customer). Customer can order Getinge part number 530957 ES–18/24/30/36/48 blow down tank for this purpose.

UNIT WEIGHTS AND CRATED MEASUREMENTS TABLE

	MAX. WEIGHT		CRATED MEASUREMENTS		
UNIT SIZE	CRATED	UNCRATED	LENGTH	WIDTH	HEIGHT
26" SINGLE DOOR	1,160	1,010	64"	44"	80"
39" SINGLE DOOR DOUBLE DOOR	1,365 1,508	1,190 1,333	64"	44"	80"
51" SINGLE DOOR DOUBLE DOOR	1,506 1,649	1,331 1,474	79"	44"	80"

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SEE SHEET 1 OF 8

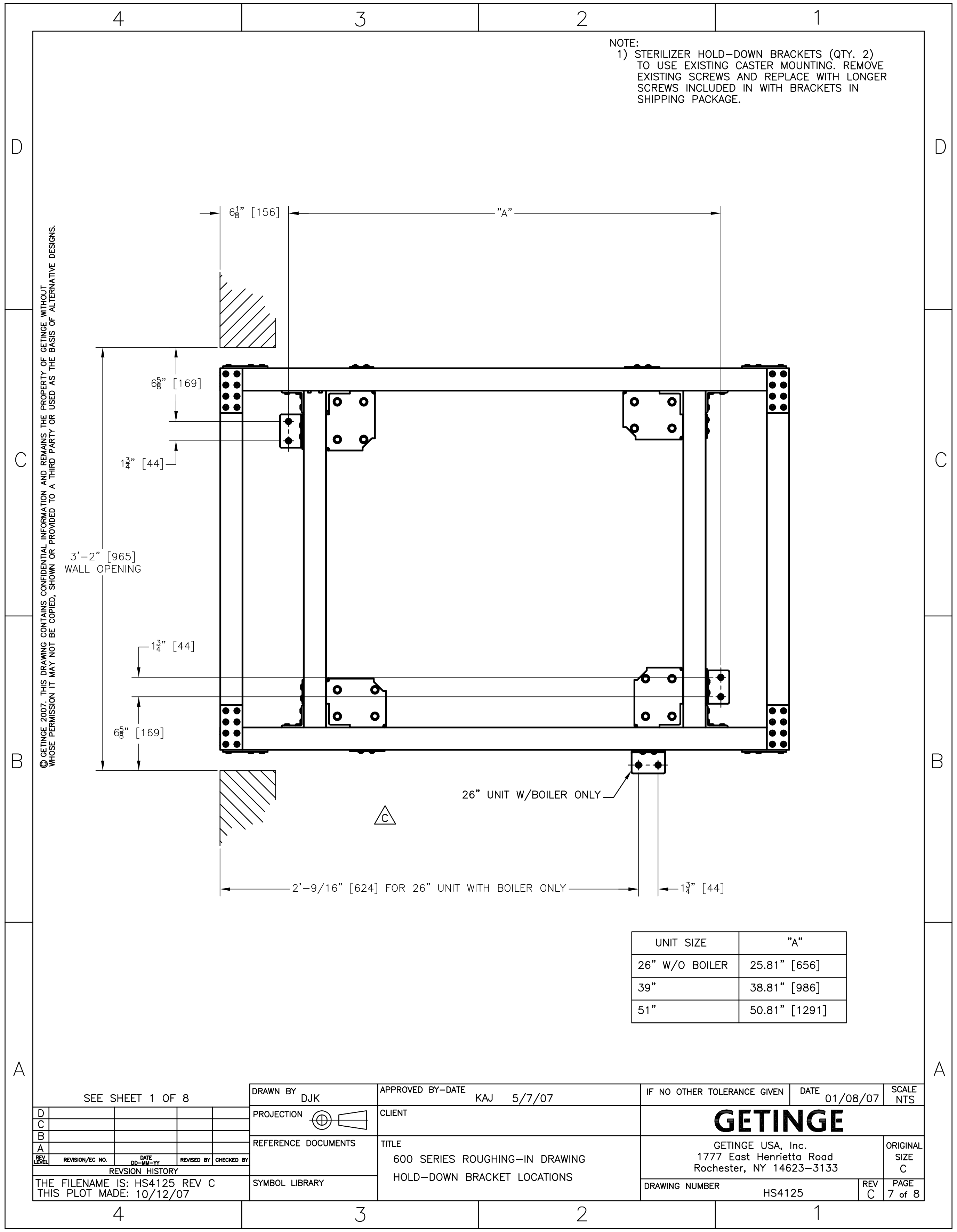
REV LEVEL	REVISION/EC NO.	DATE DD–MM–YY	REVISED BY	CHECKED BY

REVSION HISTORY

THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07

DRAWN BY DJK
APPROVED BY–DATE KAJ 5/7/07
IF NO OTHER TOLERANCE GIVEN
DATE 01/11/07
SCALE NTS
PROJECTION
CLIENT
GETINGE
REFERENCE DOCUMENTS
TITLE
600 SERIES ROUGHING–IN DRAWING
NOTES PAGE
GETINGE USA, Inc.
1777 East Henrietta Road
Rochester, NY 14623–3133
ORIGINAL SIZE C
SYMBOL LIBRARY
DRAWING NUMBER HS4125
REV B
PAGE 6 of 8

FIGURE 6–17, SHEET 4. ROUGHING-IN DRAWING


6⅛" [156]
"A"
6⅝" [169]
1¾" [44]
3'-2" [965]
WALL OPENING
1¾" [44]
6⅝" [169]
26" UNIT W/BOILER ONLY
C
2'-9/16" [624] FOR 26" UNIT WITH BOILER ONLY
1¾" [44]
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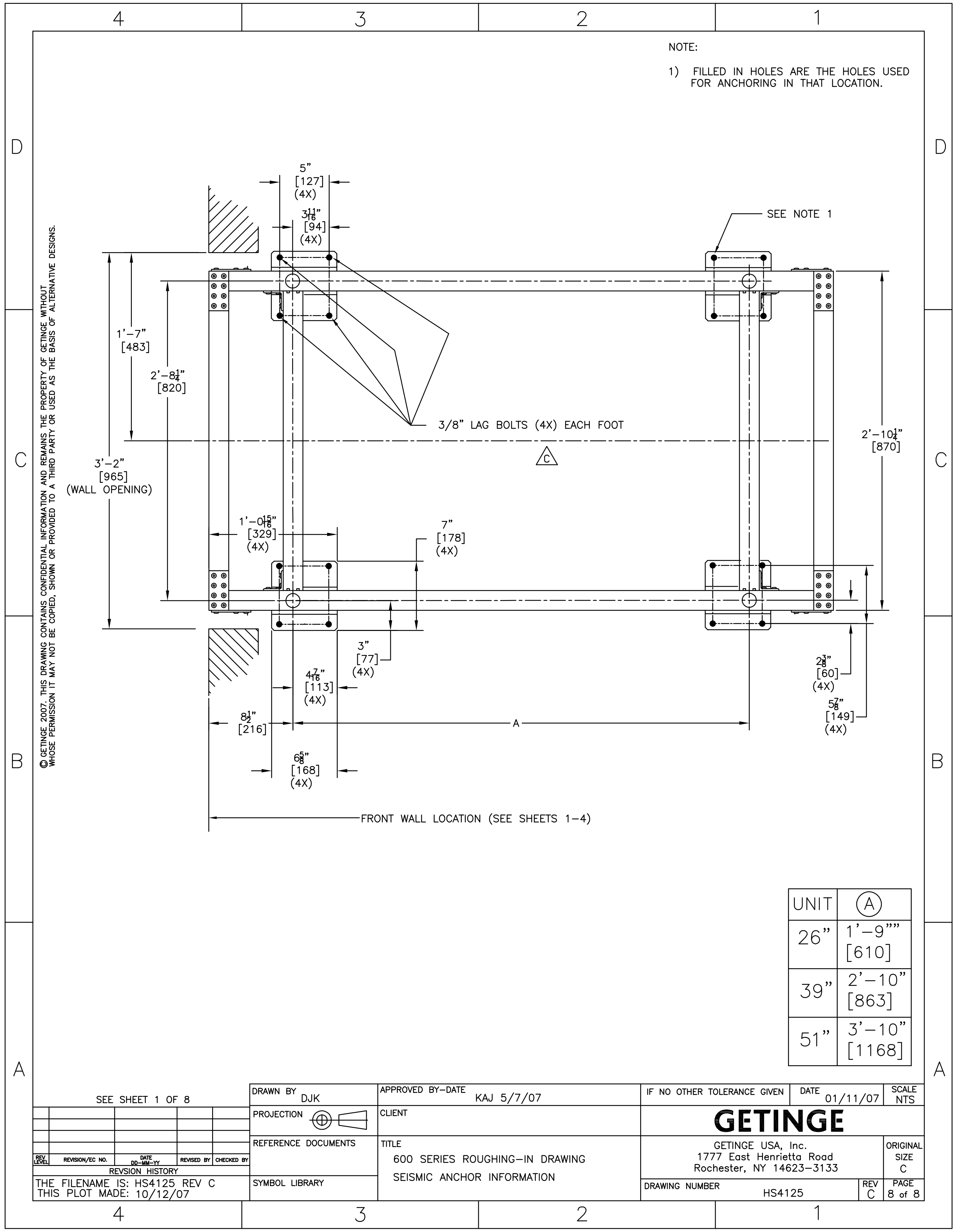
NOTE:
1) STERILIZER HOLD-DOWN BRACKETS (QTY. 2) TO USE EXISTING CASTER MOUNTING. REMOVE EXISTING SCREWS AND REPLACE WITH LONGER SCREWS INCLUDED IN WITH BRACKETS IN SHIPPING PACKAGE.

UNIT SIZE	"A"
26" W/O BOILER	25.81" [656]
39"	38.81" [986]
51"	50.81" [1291]

SEE SHEET 1 OF 8
REVSION HISTORY
THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07
DRAWN BY DJK
APPROVED BY–DATE KAJ 5/7/07
IF NO OTHER TOLERANCE GIVEN
DATE 01/08/07
SCALE NTS
PROJECTION
CLIENT
GETINGE
REFERENCE DOCUMENTS
TITLE
600 SERIES ROUGHING–IN DRAWING
HOLD–DOWN BRACKET LOCATIONS
GETINGE USA, Inc.
1777 East Henrietta Road
Rochester, NY 14623–3133
ORIGINAL SIZE C
SYMBOL LIBRARY
DRAWING NUMBER HS4125
REV C
PAGE 7 of 8


5"
[127]
(4X)
3 11/16"
[94]
(4X)
SEE NOTE 1
1'-7"
[483]
2'-8¼"
[820]
3/8" LAG BOLTS (4X) EACH FOOT
C
2'-10¼"
[870]
3'-2"
[965]
(WALL OPENING)
1'-0 15/16"
[329]
(4X)
7"
[178]
(4X)
3"
[77]
(4X)
4 7/16"
[113]
(4X)
2⅜"
[60]
(4X)
5⅞"
[149]
(4X)
8½"
[216]
A
6⅝"
[168]
(4X)
FRONT WALL LOCATION (SEE SHEETS 1–4)
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NOTE:
1) FILLED IN HOLES ARE THE HOLES USED FOR ANCHORING IN THAT LOCATION.

UNIT	Ⓐ
26"	1'–9"" [610]
39"	2'–10" [863]
51"	3'–10" [1168]

SEE SHEET 1 OF 8
REVSION HISTORY
THE FILENAME IS: HS4125 REV C
THIS PLOT MADE: 10/12/07
DRAWN BY DJK
APPROVED BY–DATE KAJ 5/7/07
IF NO OTHER TOLERANCE GIVEN
DATE 01/11/07
SCALE NTS
PROJECTION
CLIENT
GETINGE
REFERENCE DOCUMENTS
TITLE
600 SERIES ROUGHING–IN DRAWING
SEISMIC ANCHOR INFORMATION
GETINGE USA, Inc.
1777 East Henrietta Road
Rochester, NY 14623–3133
ORIGINAL SIZE C
SYMBOL LIBRARY
DRAWING NUMBER HS4125
REV C
PAGE 8 of 8

FIGURE 6–18, SHEET 1. SEISMIC ANCHORAGE DRAWING

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING
www.equipmentanchorage.com

GETINGE PART NO. 700601

GETINGE USA, INC.
ROCHESTER, NEW YORK

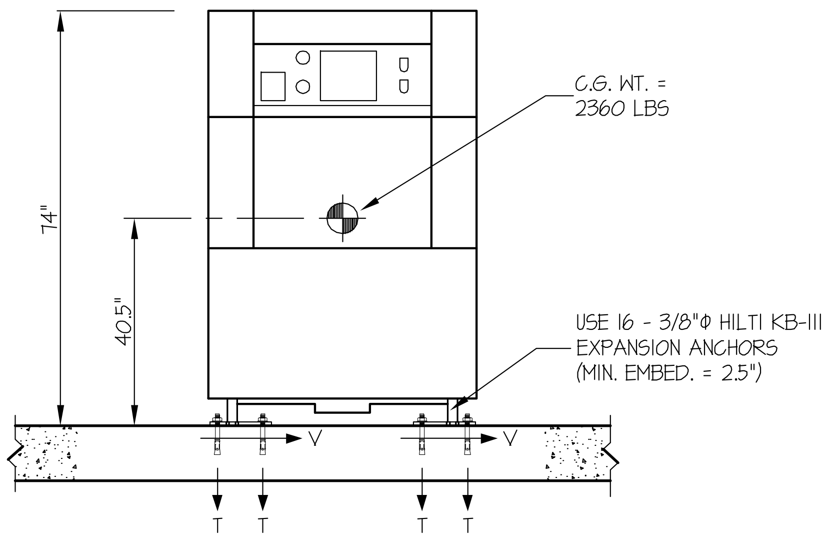
600 SERIES STEAM STERILIZER
VESSEL SIZE: 26"W X 26"H X 26"L
OR 39"L OR 51"L

DES. R. LA BRIE
EASE JOB NO. 36-0701
DATE 9/20/07
SHEET 1 OF 4 SHEETS
700601

REVISION		ECO NUMBER	DATE
CURRENT	B	122552	12/10/07
PREVIOUS	A	122413	6/14/07

SEISMIC ANCHORAGE

SLAB ON GRADE


C.G. WT. = 2360 LBS
74"
40.5"
USE 16 - 3/8"Φ HILTI KB-III EXPANSION ANCHORS (MIN. EMBED. = 2.5")
V
V
T
T
T
T

FRONT ELEVATION

T_{MAX} = 153 LBS / BOLT
V_{MAX} = 86 LBS / BOLT

NOTES:

1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.50W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 1.5)
   VERTICAL FORCE (V_V) = 0.35W
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS & HEIGHTS UP TO THE MAXIMUM SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

JOSEPH H. LaBRIE
No. 3566
EXP. 3-31-2008
9/20/07

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING
www.equipmentanchorage.com

GETINGE PART NO. 700601

GETINGE USA, INC.
ROCHESTER, NEW YORK

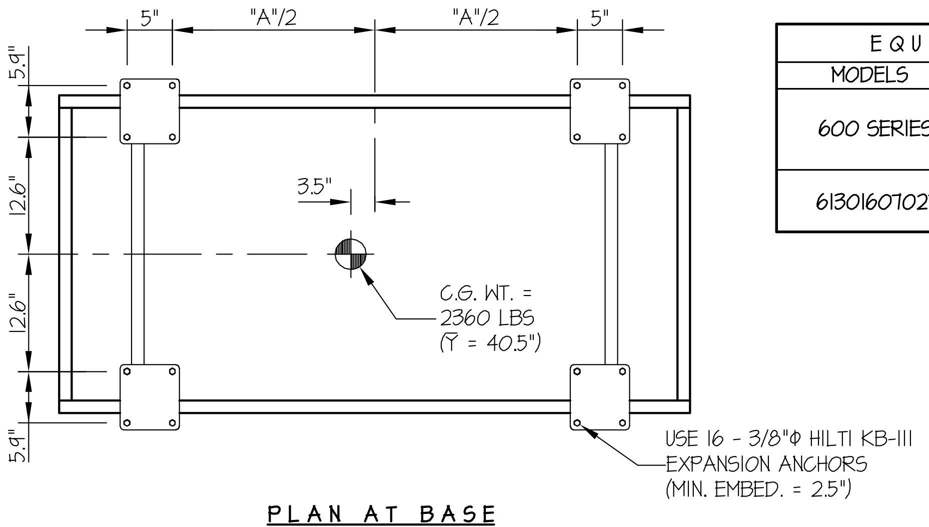
600 SERIES STEAM STERILIZER
VESSEL SIZE: 26"W X 26"H X 26"L
OR 39"L OR 51"L

DES. R. LA BRIE
EASE JOB NO. 36-0701
DATE 9/20/07
SHEET 2 OF 4 SHEETS
700601

REVISION		ECO NUMBER	DATE
CURRENT	B	122552	12//10/07
PREVIOUS	A	122413	6/14/07

SEISMIC ANCHORAGE

SLAB ON GRADE


5"
"A"/2
"A"/2
5"
5.9"
12.6"
12.6"
5.9"
3.5"
C.G. WT. = 2360 LBS (Ȳ = 40.5")
USE 16 - 3/8"Φ HILTI KB-III EXPANSION ANCHORS (MIN. EMBED. = 2.5")

PLAN AT BASE

EQUIPMENT LIST	
MODELS	TYPE
600 SERIES	STEAM STERILIZERS
61301607027	INSTALLATION MANUAL

	UNIT	A
	26"	13.6"
	39"	26.6"
*	51"	38.6"

* THIS UNIT USED IN CALC BELOW

LOADS:
WEIGHT = 2360 LBS
HORIZONTAL FORCE (V_H) = 1180 LBS
VERTICAL FORCE (V_V) = 826 LBS

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \underbrace{\left[\frac{1180\#(40.5'')(15.55'')}{4_{BOLTS}\,(43.6'')(31.1'')} \times (0.3)\right]}_{\text{(HORIZ. - SIDE TO SIDE)}} + \underbrace{\frac{1180\#(40.5'')(25.3'')}{4_{BOLTS}\,(31.1'')(43.6'')}}_{\text{(HORIZ. - FRONT TO BACK)}} - \underbrace{\frac{(2360\# - 826\#)(25.3'')(15.6'')}{4_{BOLTS}\,(43.6'')(31.1'')}}_{\text{(WEIGHT - }V_V\text{)}} = 153 \text{ LBS/BOLT (MAX)}$$

SHEAR (V)

$$V = \frac{1180\#(25.3'')}{8_{BOLTS}\,(43.6'')} = 86 \text{ LBS/BOLT (MAX)}$$

FIGURE 6–18, SHEET 2. SEISMIC ANCHORAGE DRAWING

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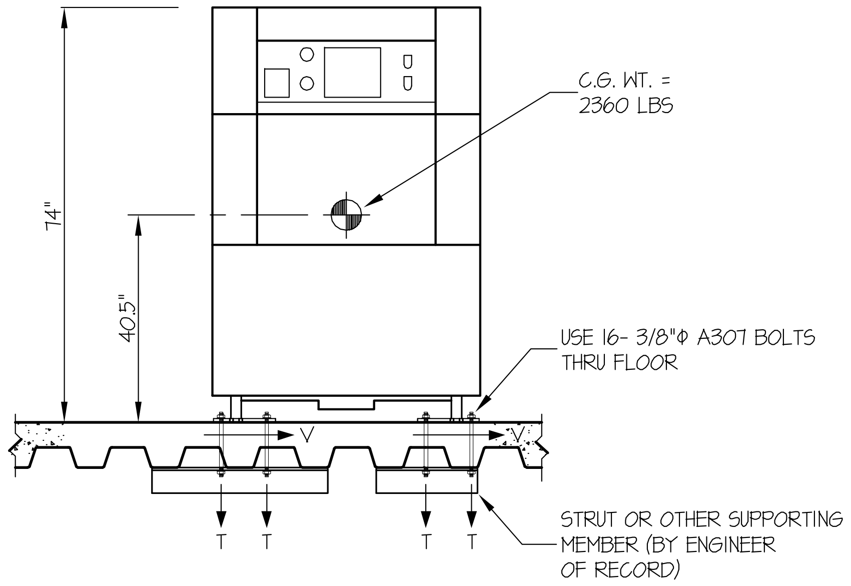
VESSEL SIZE: 26"W X 26"H X 26"L
OR 39"L OR 51"L

DES. R. LA BRIE
EASE JOB NO. 36-0701
DATE 9/20/07
SHEET 3 OF 4 SHEETS
700601

REVISION		ECO NUMBER	DATE
CURRENT	B	122552	12/10/07
PREVIOUS	A	122413	6/14/07

SEISMIC ANCHORAGE — UPPER FLOOR



74"
40.5"
C.G. WT. = 2360 LBS
USE 16- 3/8"Φ A307 BOLTS THRU FLOOR
V
V
T
T
T
T
STRUT OR OTHER SUPPORTING MEMBER (BY ENGINEER OF RECORD)

FRONT ELEVATION

T_{MAX} = 264 LBS / BOLT
V_{MAX} = 122 LBS / BOLT

NOTES:

1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.71W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 3.0)
   VERTICAL FORCE (V_V) = 0.35W
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS & HEIGHTS UP TO THE MAXIMUM SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

No. 3566
EXP. 3-31-2008
9/20/07

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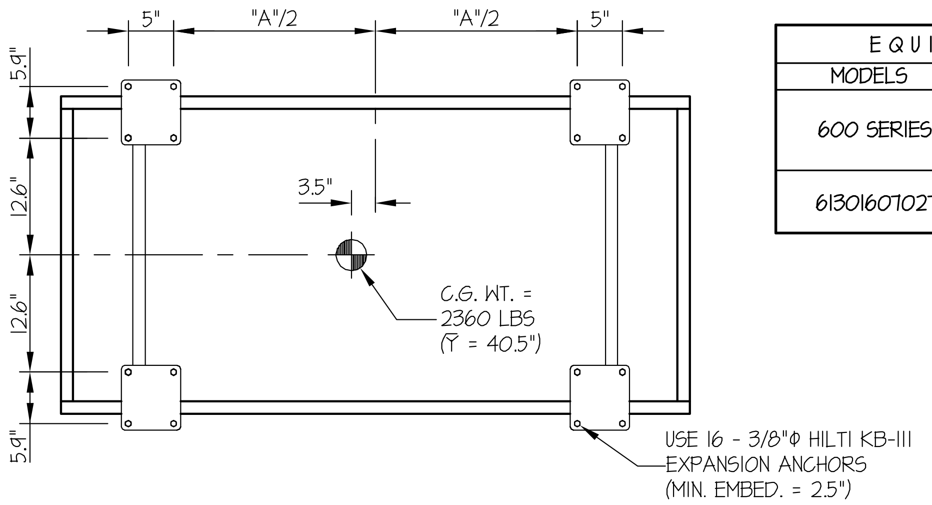
ROCHESTER, NEW YORK

600 SERIES STEAM STERILIZER
VESSEL SIZE: 26"W X 26"H X 26"L
OR 39"L OR 51"L

DES. R. LA BRIE
EASE JOB NO. 36-0701
DATE 9/20/07
SHEET 4 OF 4 SHEETS
700601

REVISION		ECO NUMBER	DATE
CURRENT	B	122552	12/10/07
PREVIOUS	A	122413	6/14/07

SEISMIC ANCHORAGE — UPPER FLOOR



5"
"A"/2
"A"/2
5"
5.9"
12.6"
12.6"
5.9"
3.5"
C.G. WT. = 2360 LBS (Ȳ = 40.5")
USE 16 - 3/8"Φ HILTI KB-III EXPANSION ANCHORS (MIN. EMBED. = 2.5")

PLAN AT BASE

EQUIPMENT LIST	
MODELS	TYPE
600 SERIES	STEAM STERILIZERS
61301607027	INSTALLATION MANUAL

UNIT	A
26"	13.6"
39"	26.6"
* 51"	38.6"

* THIS UNIT USED IN CALC BELOW

LOADS:
WEIGHT = 2360 LBS
HORIZONTAL FORCE (V_H) = 1676 LBS
VERTICAL FORCE (V_V) = 826 LBS

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \left[\underbrace{\frac{1676\#(40.5'')(15.55'')}{4_{BOLTS}\,(43.6'')(31.1'')} \times (0.3)}_{\text{(HORIZ. - SIDE TO SIDE)}}\right] + \underbrace{\frac{1676\#(40.5'')(25.3'')}{4_{BOLTS}\,(31.1'')(43.6'')}}_{\text{(HORIZ. - FRONT TO BACK)}} - \underbrace{\frac{(2360\# - 826\#)(25.3'')(15.6'')}{4_{BOLTS}\,(43.6'')(31.1'')}}_{\text{(WEIGHT - }V_V\text{)}} = 264 \text{ LBS/BOLT (MAX)}$$

SHEAR (V)

$$V = \frac{1676\#(25.3'')}{8_{BOLTS}\,(43.6'')} = 122 \text{ LBS/BOLT (MAX)}$$

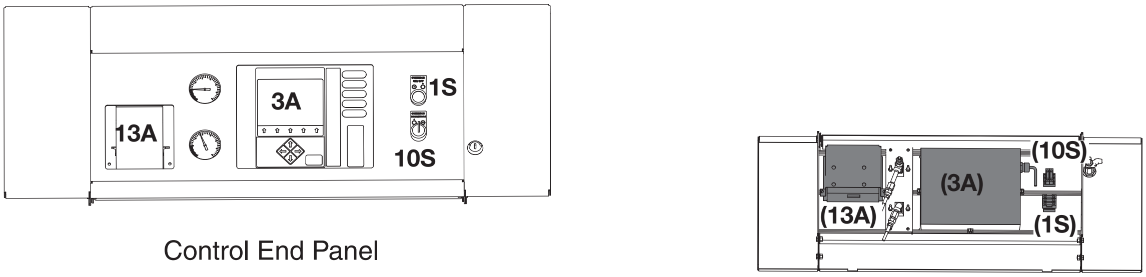
SECTION 7 COMPONENT LOCATIONS

INTRODUCTION

The following drawings show the locations of electrical and piping components, and identify them by the reference designators used on the Piping and Instrument Drawing, Process Phase Diagram, Wiring Diagrams, and Electrical Schematics. For an illustrated breakdown with part numbers, see the 600 Series Parts Catalog PN 61301607029.

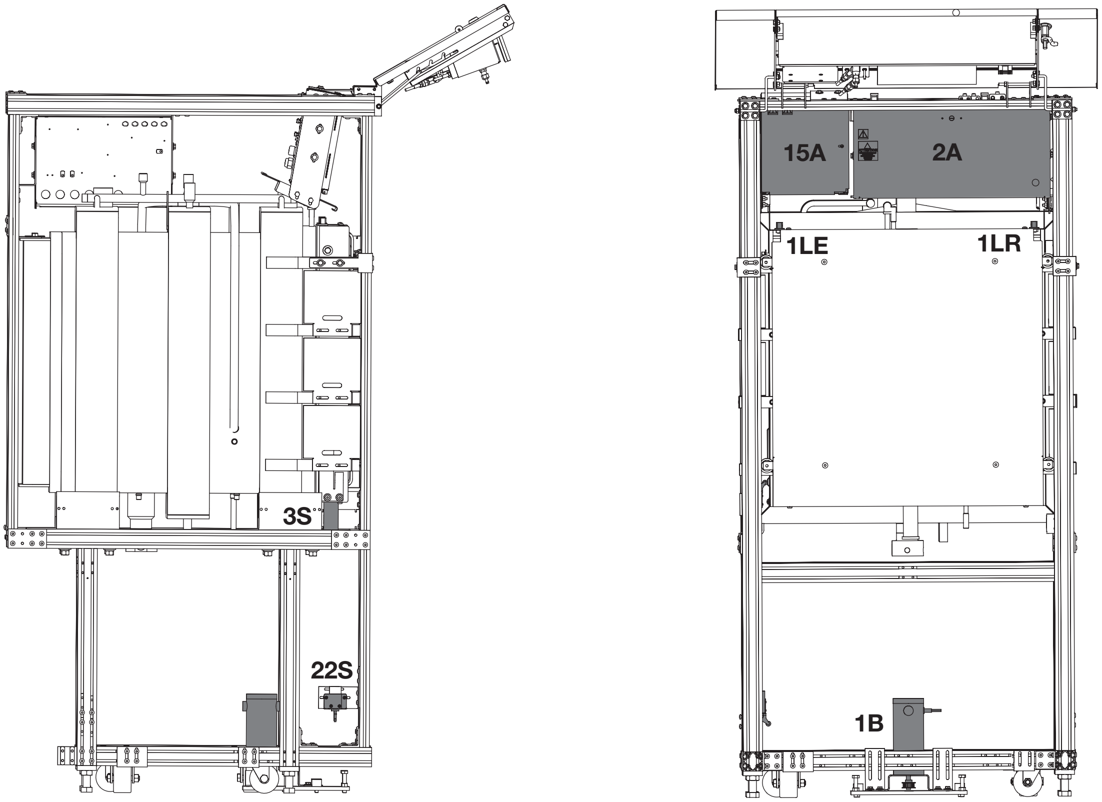
This section also identifies the components of the GTS-30A Steam Boiler, CAS-45A Steam Boiler, and MP-129F Water-Saver, and provides lists of consumable items and recommended spare parts.

FIGURE 7–1, SHEET 1. ELECTRICAL PACKAGE


13A
3A
1S
10S
(10S)
(3A)
(13A)
(1S)

Control End Panel

(panel in raised position)

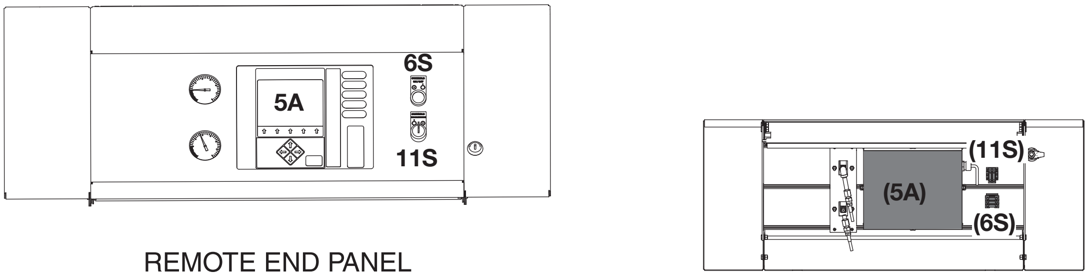

3S
22S
15A
2A
1LE
1LR
1B

LEFT SIDE VIEW

FRONT VIEW

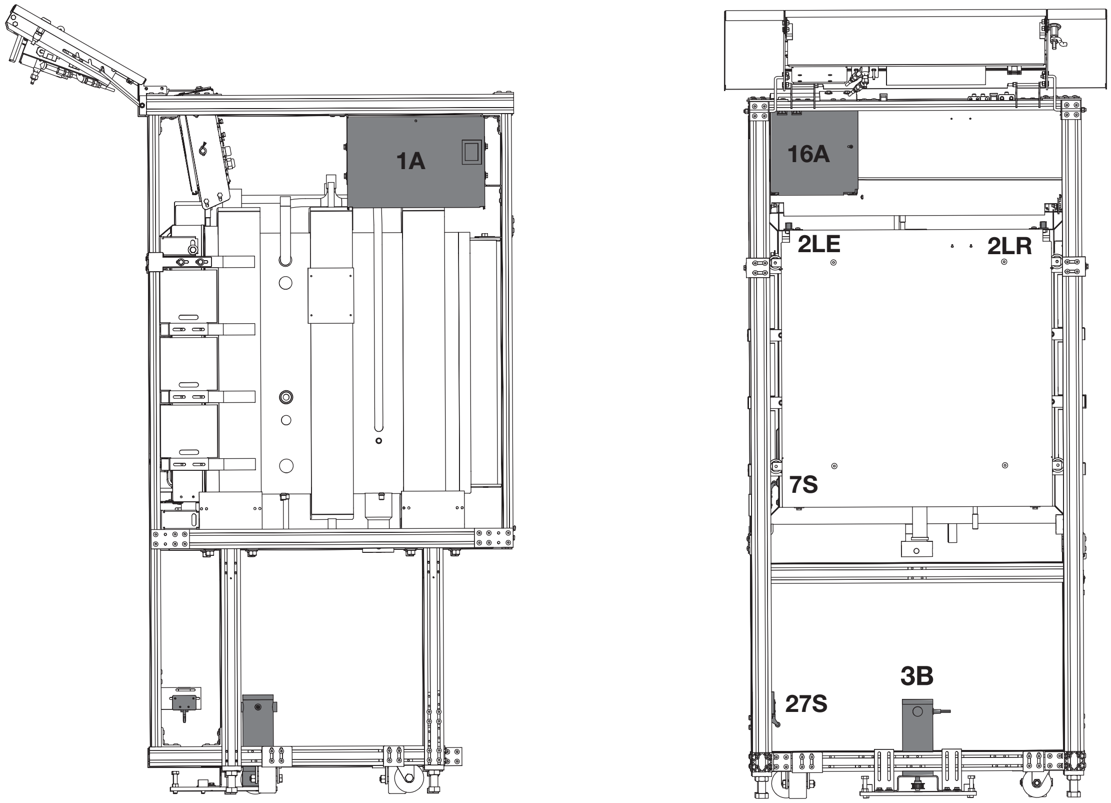
A07028-T1

FIGURE 7–1, SHEET 2. ELECTRICAL PACKAGE


6S
5A
11S
(11S)
(5A)
(6S)

REMOTE END PANEL

(panel In raised position)

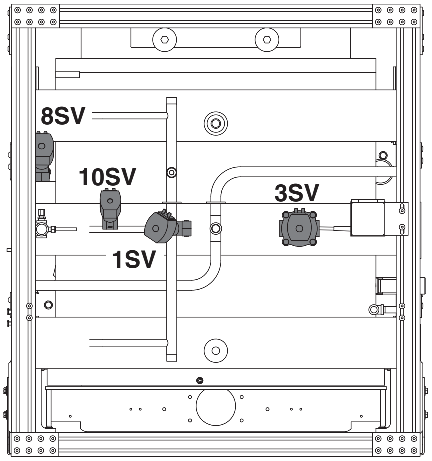

1A
16A
2LE
2LR
7S
3B
27S

RIGHT SIDE VIEW

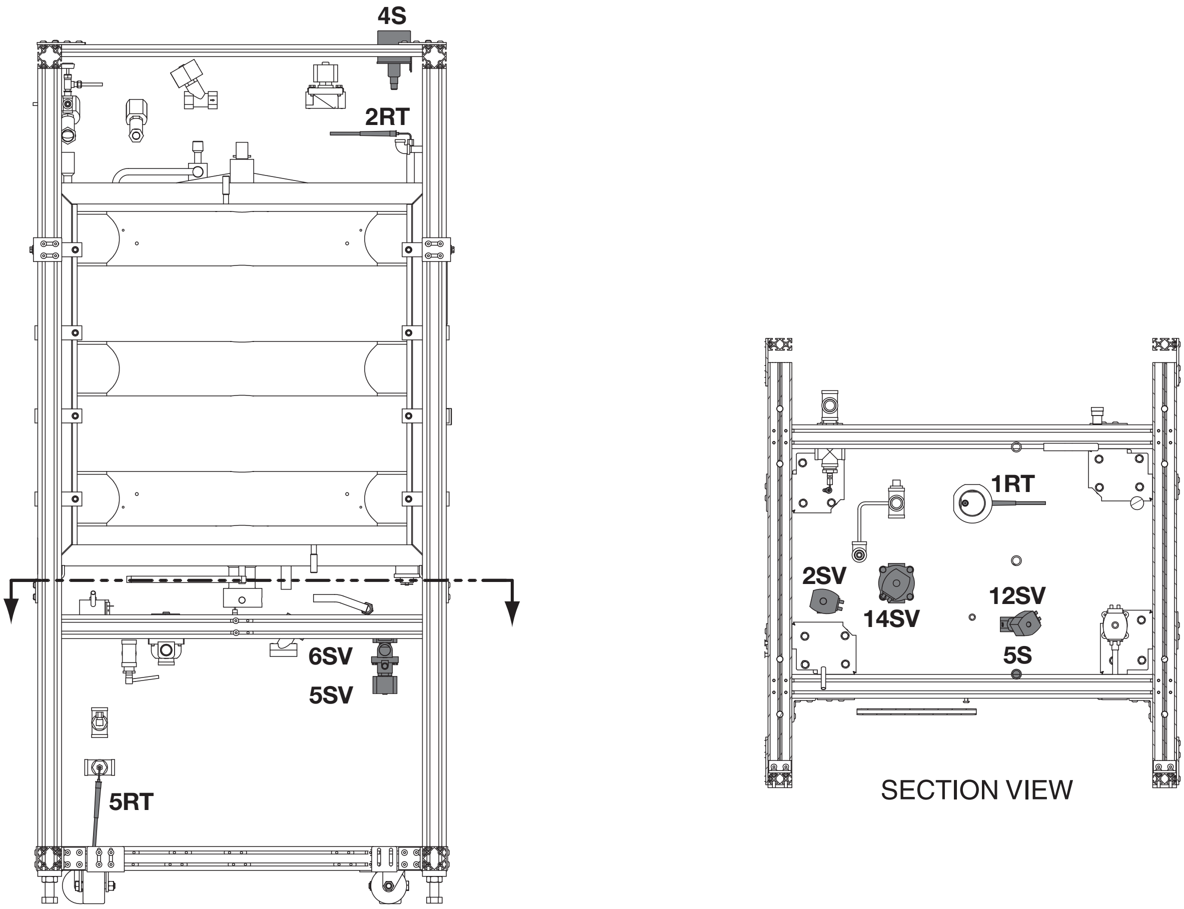
REAR VIEW
(Double Door Unit)

A07028-T2

FIGURE 7–1, SHEET 3. ELECTRICAL PACKAGE


8SV
10SV
3SV
1SV

TOP VIEW

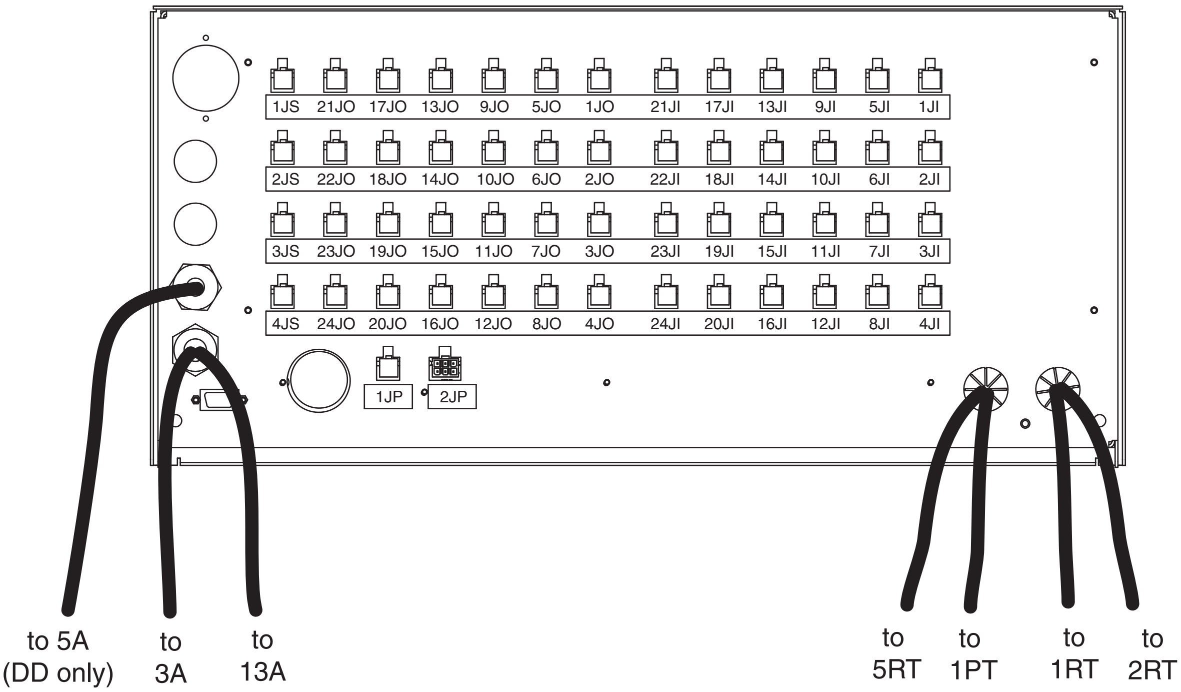

4S
2RT
6SV
5SV
5RT
1RT
2SV
14SV
12SV
5S

FRONT VIEW

SECTION VIEW

A07028-T3

FIGURE 7–1, SHEET 4. ELECTRICAL PACKAGE


1JS
21JO
17JO
13JO
9JO
5JO
1JO
21JI
17JI
13JI
9JI
5JI
1JI
2JS
22JO
18JO
14JO
10JO
6JO
2JO
22JI
18JI
14JI
10JI
6JI
2JI
3JS
23JO
19JO
15JO
11JO
7JO
3JO
23JI
19JI
15JI
11JI
7JI
3JI
4JS
24JO
20JO
16JO
12JO
8JO
4JO
24JI
20JI
16JI
12JI
8JI
4JI
1JP
2JP
to 5A (DD only)
to 3A
to 13A
to 5RT
to 1PT
to 1RT
to 2RT

☞ See Figure 6-6, “Control Box 2A Wiring Diagram” for identification of internal components.

Interlock Inputs

1JS	Door Sealed 4PS
2JS	Jumper
3JS	
4JS	Jumper (SD only)

Power Inputs

1JP	24 VDC from Power Box 1A
2JP	24 VDC (switched) from 1S

Digital Outputs

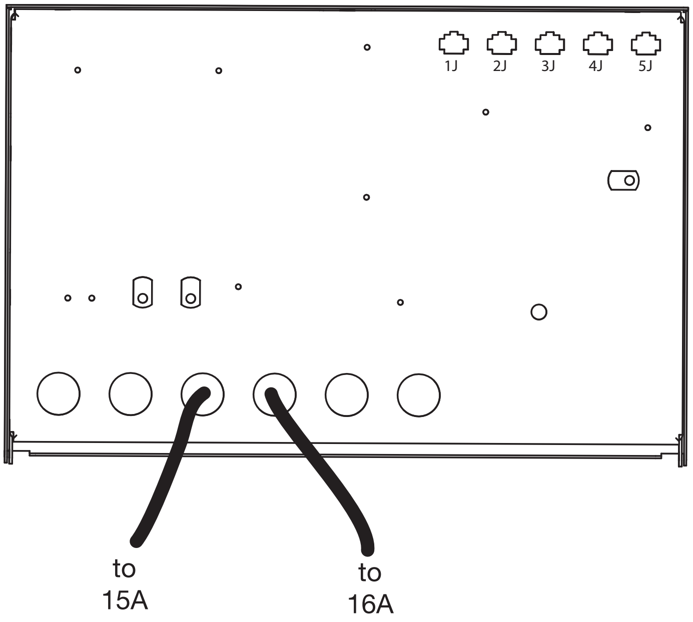
1JO	Steam to Chamber 1SV
2JO	Chamber Drain 2SV
3JO	Chamber Air-In 3SV
4JO	Secondary Drain 14SV
5JO	Secondary Buzzer
6JO	Water to Ejector 6SV
7JO	Boiler On
8JO	Steam to Jacket
9JO	CE Open
10JO	CE Close
11JO	CE/(RE) Seal 10SV
12JO	CE/(RE) Seal 12SV
13JO	RE Open
14JO	RE Close
15JO	Water-Saver
16JO	Boiler B.D.
17JO	
18JO	
19JO	
20JO	
21JO	
22JO	Water to Drain 5SV
23JO	
24JO	

Digital Inputs

1JI	CE Open
2JI	CE Not Closed
3JI	CE Not Obstructed
4JI	CE/(RE) Sealed
5JI	RE Open
6JI	RE Not Closed
7JI	
8JI	RE Not Obstructed
9JI	H20 Not in Drain
10JI	Controls ON

A07028-T4

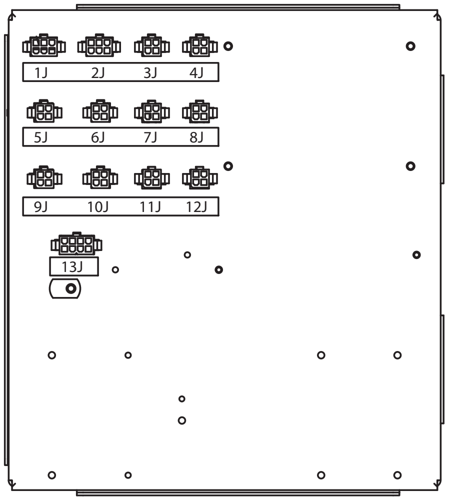
FIGURE 7–1, SHEET 5. ELECTRICAL PACKAGE



See Figure 6-5, “Power Box 1A Wiring Diagram” for identification of internal components.

Power Box 1A Connections

1J	18 VAC to Control Box 2A
2J	24 VAC to CONTROLS ON/OFF switch 1S
3J	24 VAC to Printer 13A
4J	
5J	



See Figure 6-7, “Door I/F Box 15A/16A Wiring Diagram” for identification of internal components.

Door I/F Box 15A Connections

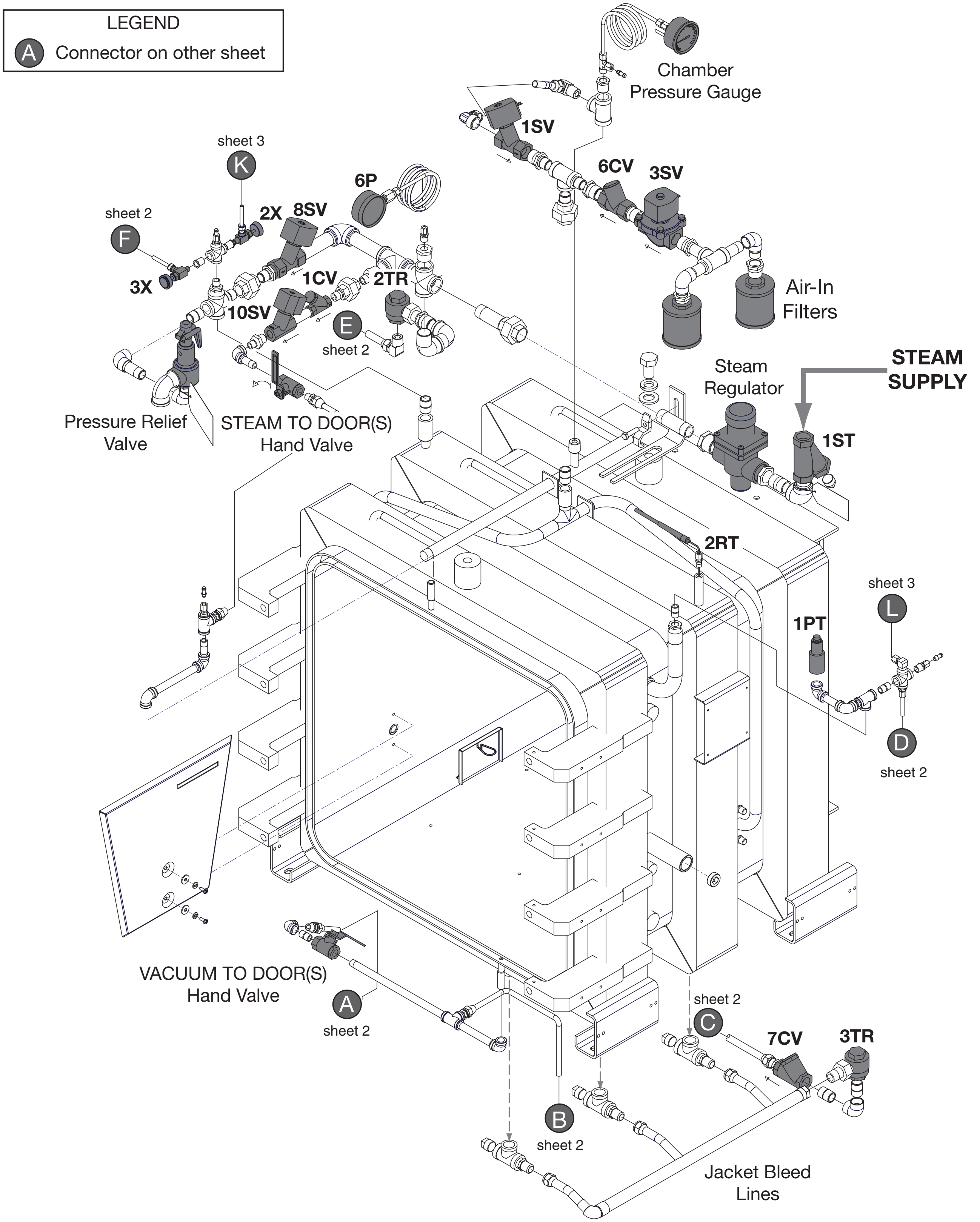
1J	115 VAC from Power Box 1A
2J	CE Door Motor 1B
3J	CE Open (from 2A9JO)
4J	CE Close (from 2A10JO)
5J	CE Photo Eye Emitter 1LE
6J	
7J	
8J	
9J	
10J	CE Photo Eye Receiver 1LR
11J	24 VAC from Control Box 2A
12J	CE Door Not Obstructed (to 2A4JI)
13J	

Door I/F Box 16A Connections

1J	115 VAC from Power Box 1A
2J	RE Door Motor 3B
3J	RE Open (from 2A13JO)
4J	RE Close (from 2A14JO)
5J	RE Photo Eye Emitter 2LE
6J	
7J	
8J	
9J	
10J	RE Photo Eye Receiver 2LR
11J	24 VDC from Control Box 2A
12J	RE Door Not Obstructed (to 2A8PI)
13J	

A07028-T5

FIGURE 7–2, SHEET 1. PIPING PACKAGE, 26" UNITS


LEGEND
A Connector on other sheet
Chamber Pressure Gauge
1SV
6CV
3SV
sheet 3
K
6P
2X
8SV
sheet 2
F
3X
1CV
2TR
10SV
E
sheet 2
Air-In Filters
STEAM SUPPLY
Steam Regulator
1ST
Pressure Relief Valve
STEAM TO DOOR(S) Hand Valve
2RT
sheet 3
L
1PT
D
sheet 2
VACUUM TO DOOR(S) Hand Valve
A
sheet 2
sheet 2
C
7CV
3TR
B
sheet 2
Jacket Bleed Lines

UPPER PIPING (26” Length Units)

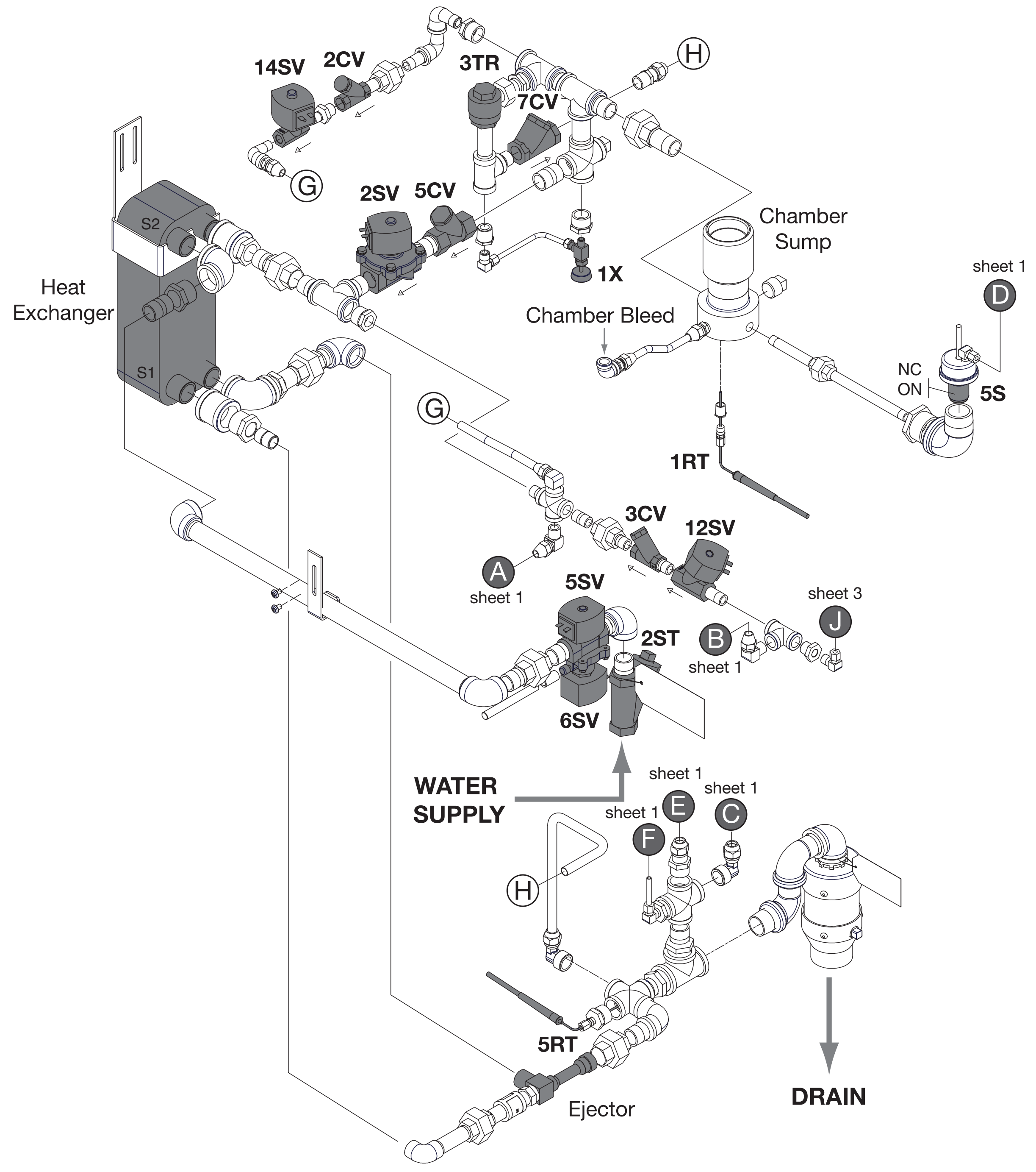
A07028-U1

FIGURE 7–2, SHEET 2. PIPING PACKAGE, 26" UNITS

LEGEND

Ⓖ Connector on this sheet

🅐 Connector on other sheet


H
14SV
2CV
3TR
7CV
G
2SV
5CV
Chamber
Sump
S2
Heat
Exchanger
1X
sheet 1
D
Chamber Bleed
S1
NC
ON
5S
G
1RT
3CV
12SV
A
sheet 1
5SV
sheet 3
J
2ST
B
sheet 1
6SV
WATER
SUPPLY
sheet 1
E
sheet 1
C
sheet 1
F
H
5RT
Ejector
DRAIN

LOWER PIPING (26” Length Units)

A07028-U2

FIGURE 7–2, SHEET 3. PIPING PACKAGE, 26" UNITS

LEGEND

Ⓙ Connector on other sheet

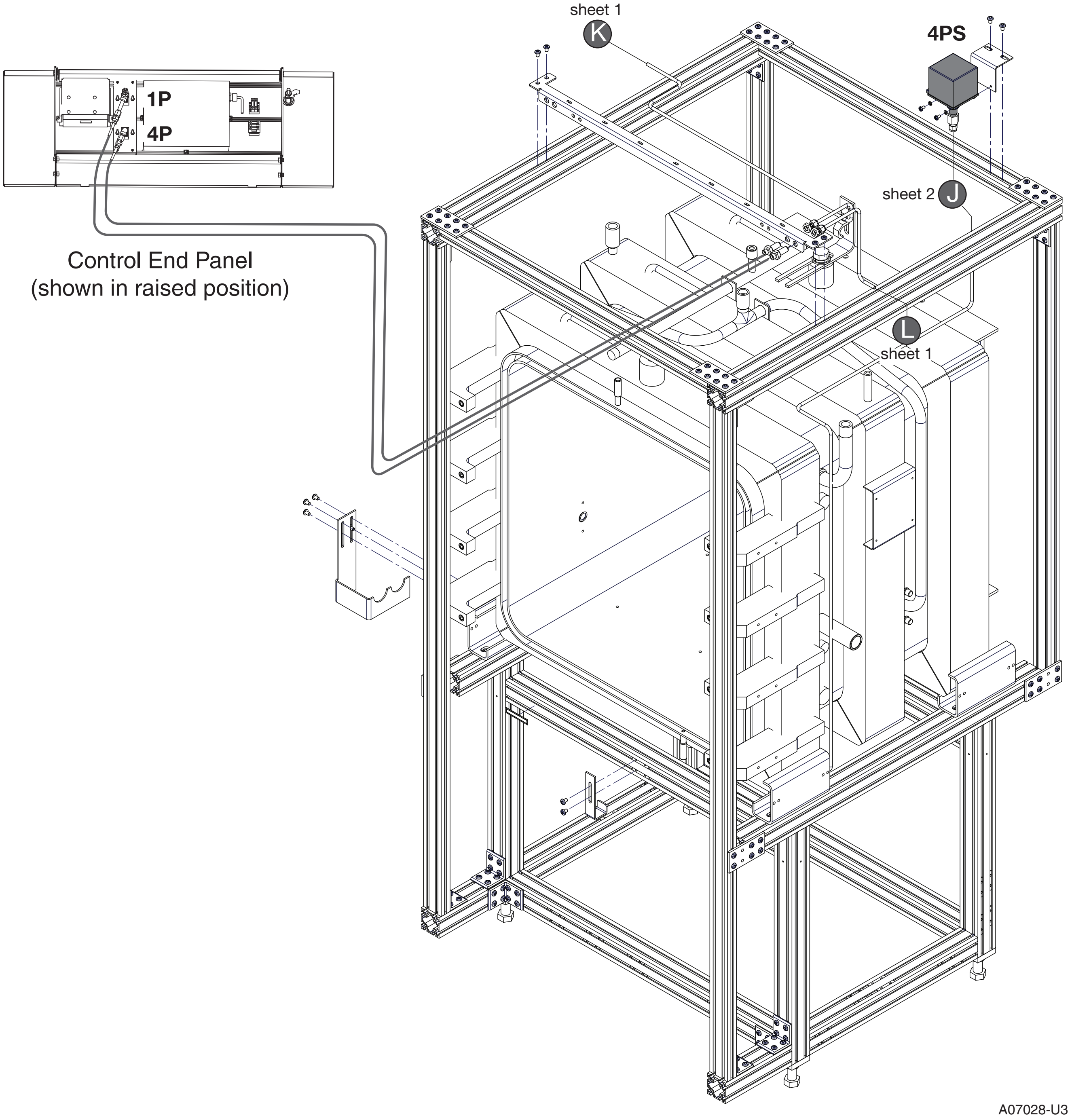
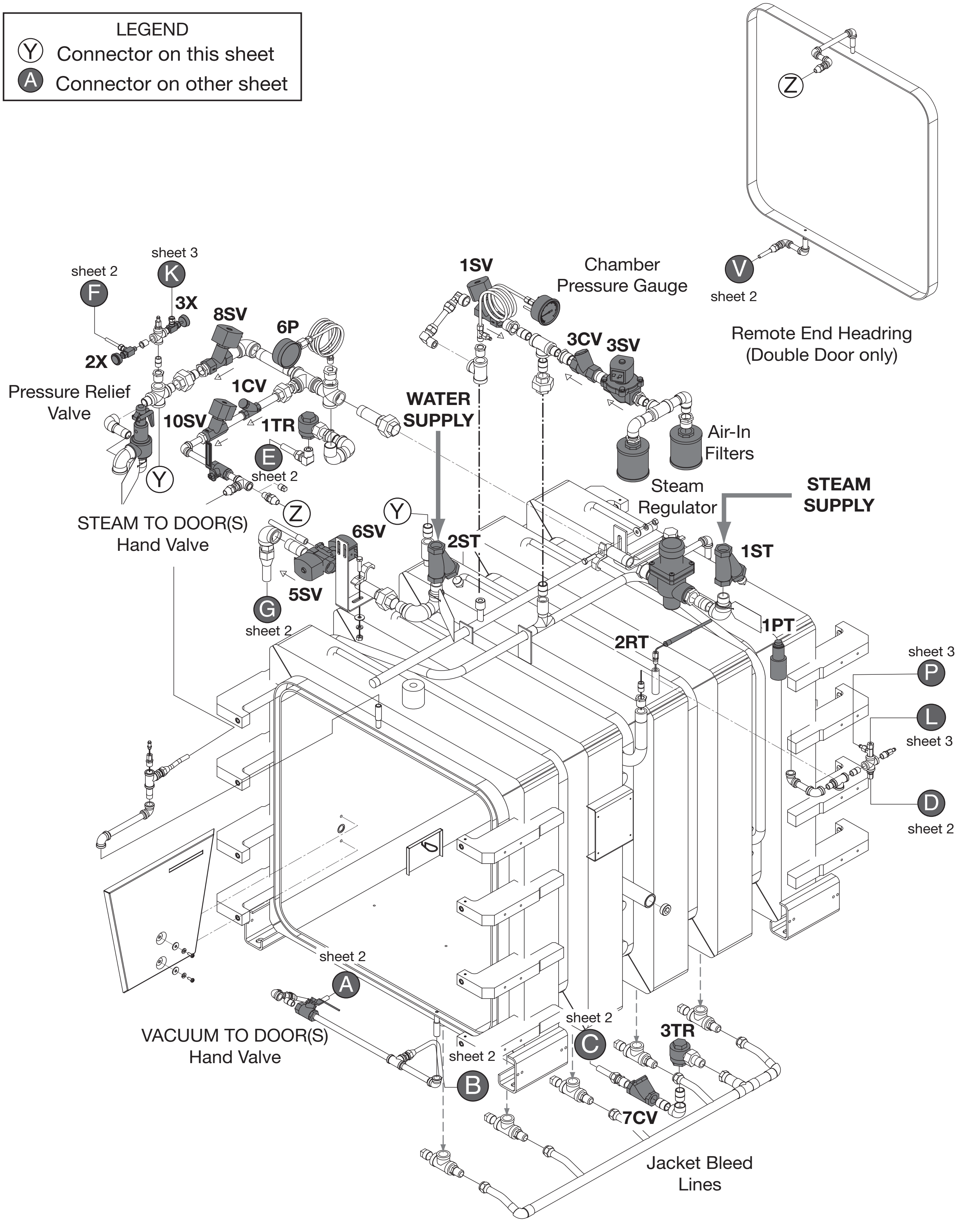

sheet 1
K
4PS
1P
4P
sheet 2
J
Control End Panel
(shown in raised position)
L
sheet 1
A07028-U3

FIGURE 7–3, SHEET 1. PIPING PACKAGE, 39" UNITS

LEGEND
Ⓨ Connector on this sheet
Ⓐ Connector on other sheet



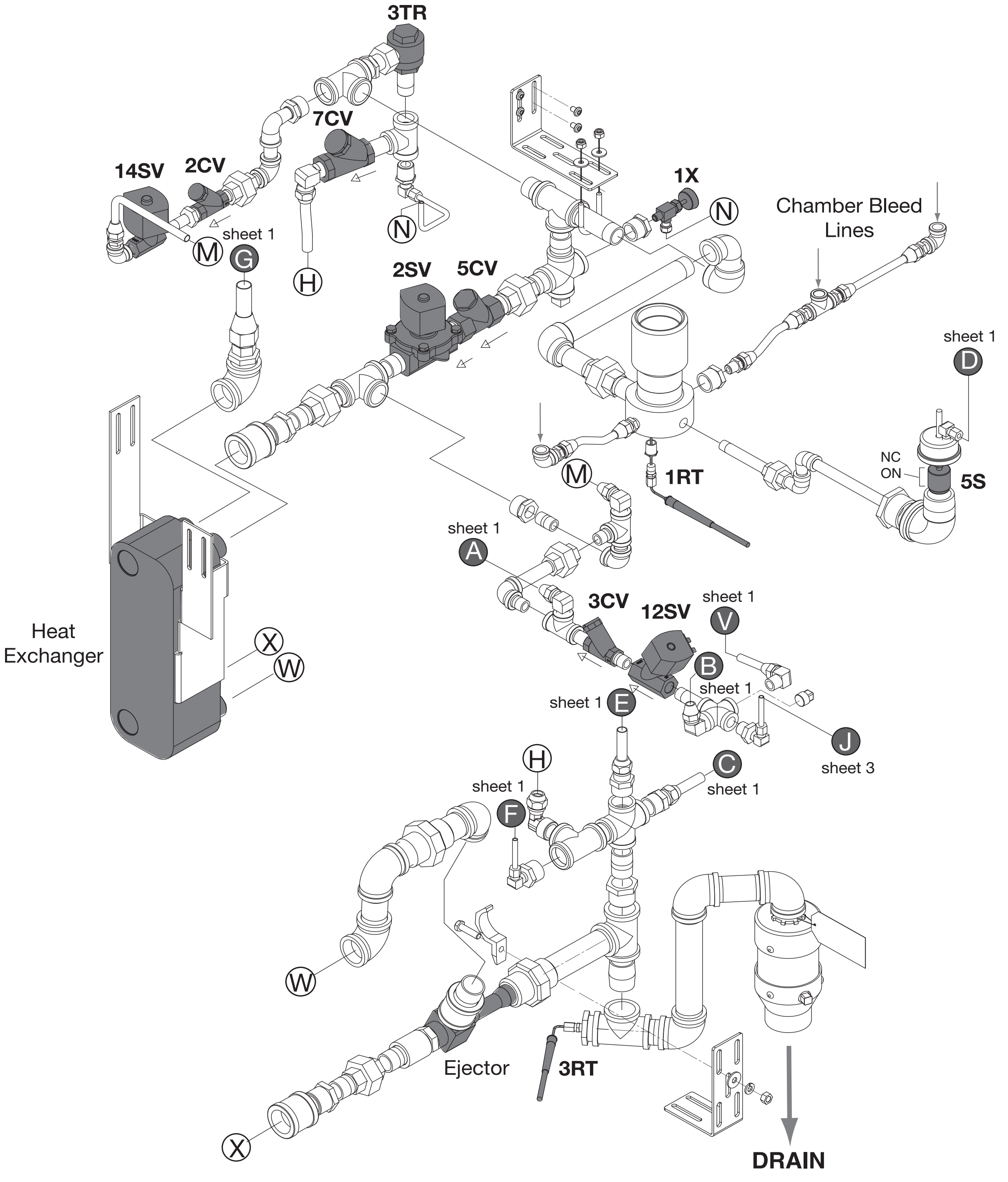
Z
V
sheet 2
Remote End Headring
(Double Door only)
sheet 3
K
sheet 2
F
3X
8SV
6P
2X
1SV
Chamber
Pressure Gauge
3CV
3SV
Pressure Relief
Valve
1CV
10SV
1TR
WATER
SUPPLY
Air-In
Filters
E
sheet 2
Y
Steam
Regulator
STEAM
SUPPLY
Z
Y
STEAM TO DOOR(S)
Hand Valve
6SV
2ST
1ST
5SV
G
sheet 2
1PT
2RT
sheet 3
P
L
sheet 3
D
sheet 2
sheet 2
A
VACUUM TO DOOR(S)
Hand Valve
sheet 2
C
3TR
sheet 2
B
7CV
Jacket Bleed
Lines

UPPER PIPING (39”Length Units)

A07028-V1

FIGURE 7–3, SHEET 2. PIPING PACKAGE, 39" UNITS

LEGEND
Ⓖ Connector on this sheet
🅐 Connector on other sheet


3TR
7CV
14SV
2CV
1X
N
Chamber Bleed Lines
M
sheet 1
G
N
H
2SV
5CV
sheet 1
D
NC
ON
5S
M
1RT
sheet 1
A
3CV
12SV
sheet 1
V
Heat Exchanger
X
W
B
sheet 1
sheet 1
E
J
sheet 3
H
C
sheet 1
sheet 1
F
W
Ejector
3RT
X
DRAIN

LOWER PIPING (39” Length Units)

A07028-V2

FIGURE 7–3, SHEET 3. PIPING PACKAGE, 39" UNITS

LEGEND

Ⓟ Connector on this sheet

🅙 Connector on other sheet

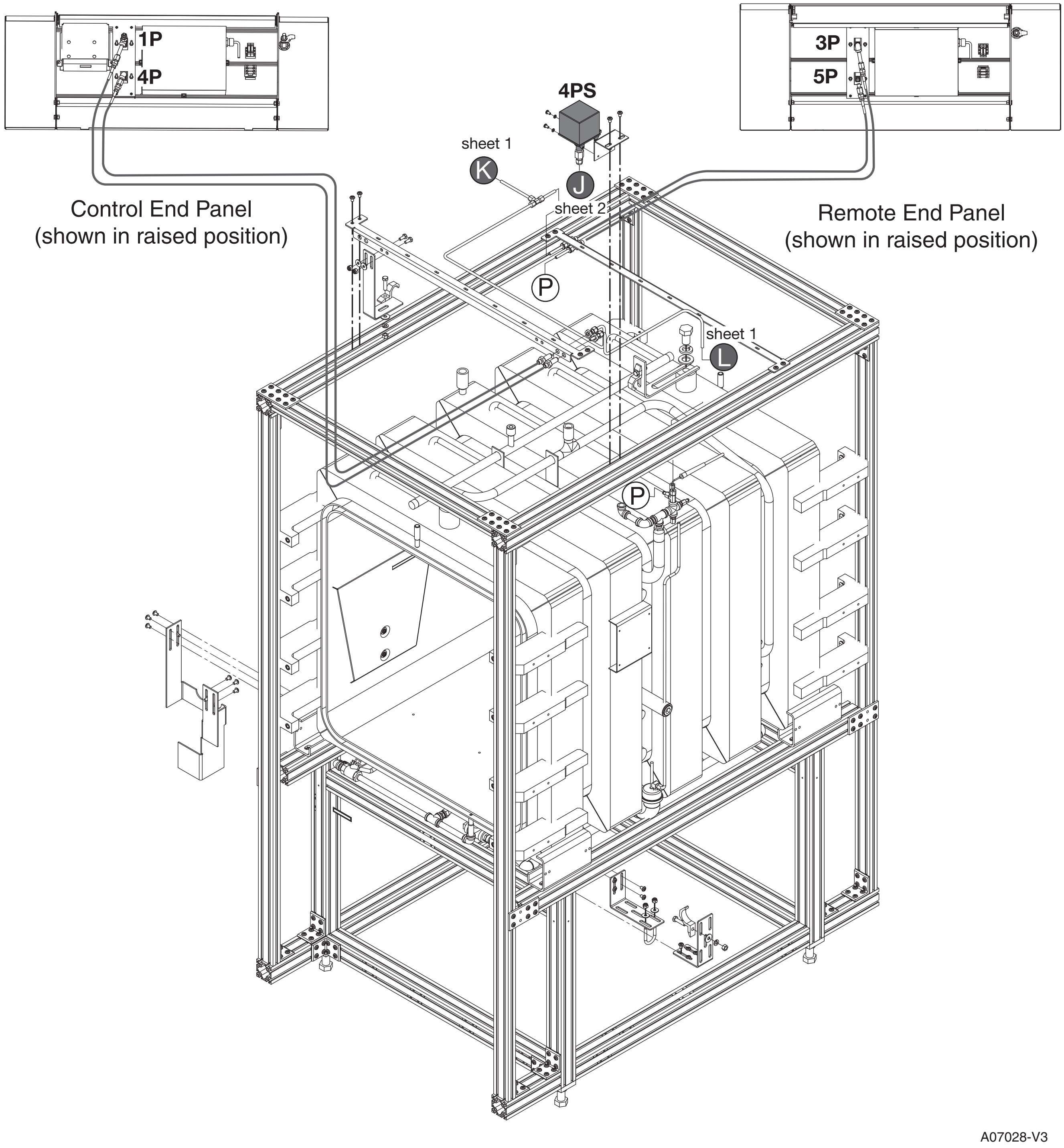
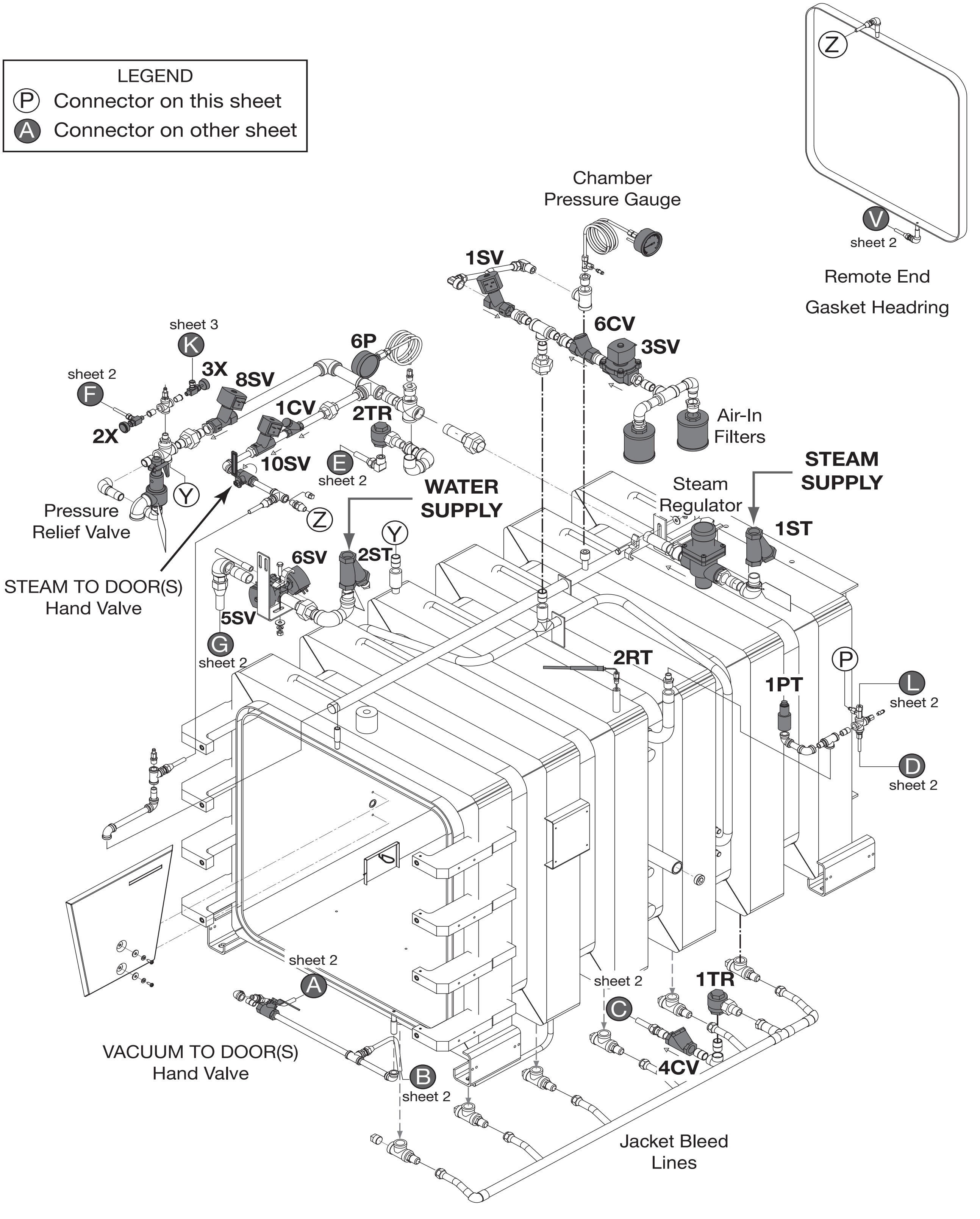

1P
4P
Control End Panel
(shown in raised position)
4PS
sheet 1
K
J
sheet 2
P
3P
5P
Remote End Panel
(shown in raised position)
sheet 1
L
P
A07028-V3

FIGURE 7–4, SHEET 1. PIPING PACKAGE, 51" UNITS

LEGEND
Ⓟ Connector on this sheet
Ⓐ Connector on other sheet


Z
V
sheet 2
Remote End
Gasket Headring
Chamber
Pressure Gauge
1SV
6CV
3SV
Air-In
Filters
sheet 3
K
3X
6P
8SV
sheet 2
F
2X
1CV
2TR
E
sheet 2
10SV
Y
Pressure
Relief Valve
Z
STEAM TO DOOR(S)
Hand Valve
WATER
SUPPLY
Y
6SV
2ST
5SV
G
sheet 2
Steam
Regulator
STEAM
SUPPLY
1ST
2RT
P
1PT
L
sheet 2
D
sheet 2
sheet 2
A
sheet 2
C
1TR
4CV
VACUUM TO DOOR(S)
Hand Valve
B
sheet 2
Jacket Bleed
Lines
A07028-W1

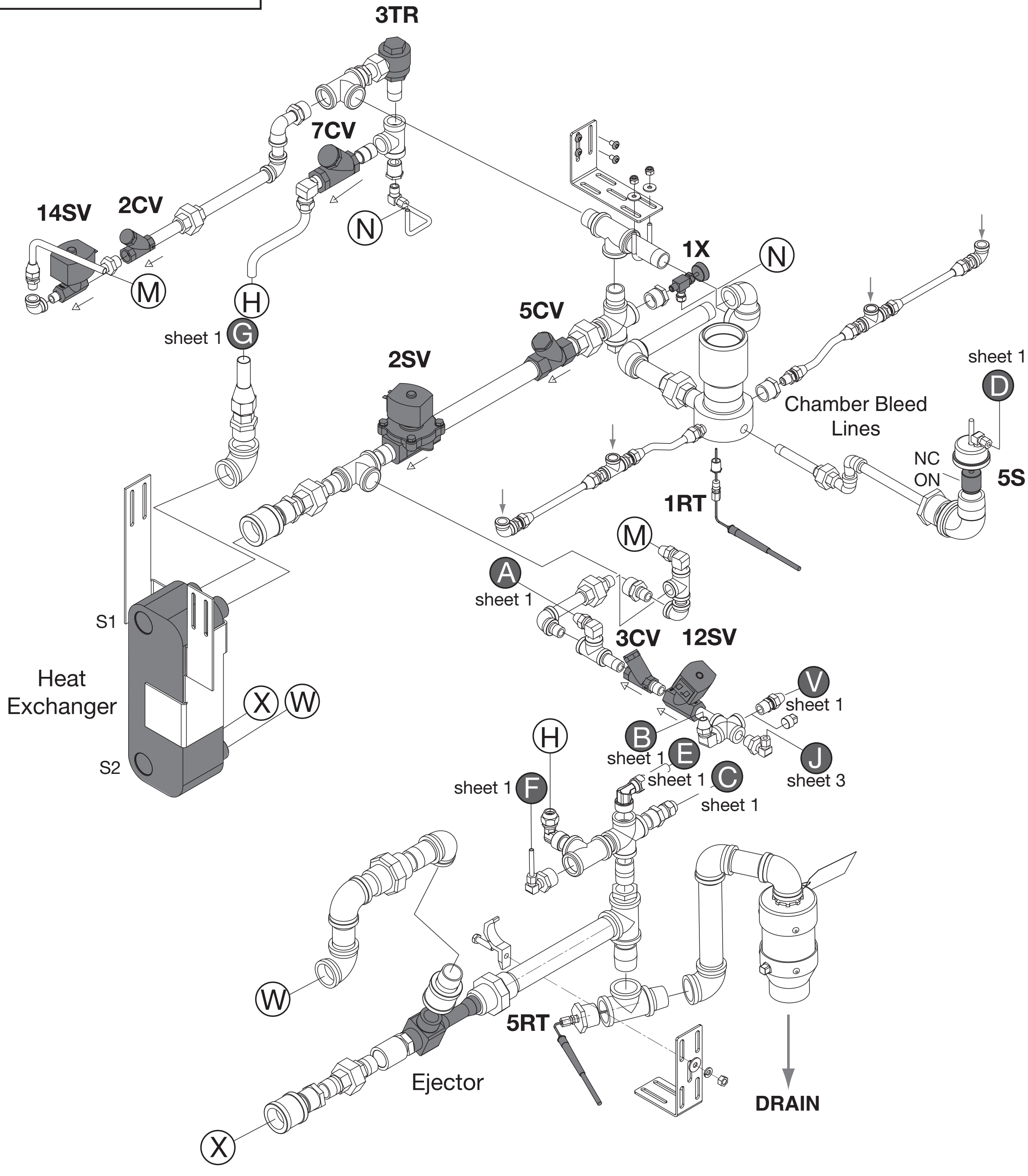
UPPER PIPING (51” Length Units)

FIGURE 7–4, SHEET 2. PIPING PACKAGE, 51" UNITS

LEGEND

Ⓖ Connector on this sheet

🅐 Connector on other sheet


3TR
7CV
14SV
2CV
N
M
H
sheet 1 G
1X
N
5CV
2SV
sheet 1
D
Chamber Bleed Lines
NC
ON
5S
1RT
M
A
sheet 1
S1
3CV
12SV
V
sheet 1
Heat Exchanger
X
W
S2
H
B
sheet 1
E
sheet 1
C
sheet 1
J
sheet 3
sheet 1
F
W
5RT
Ejector
DRAIN
X

LOWER PIPING (51” Length Units)

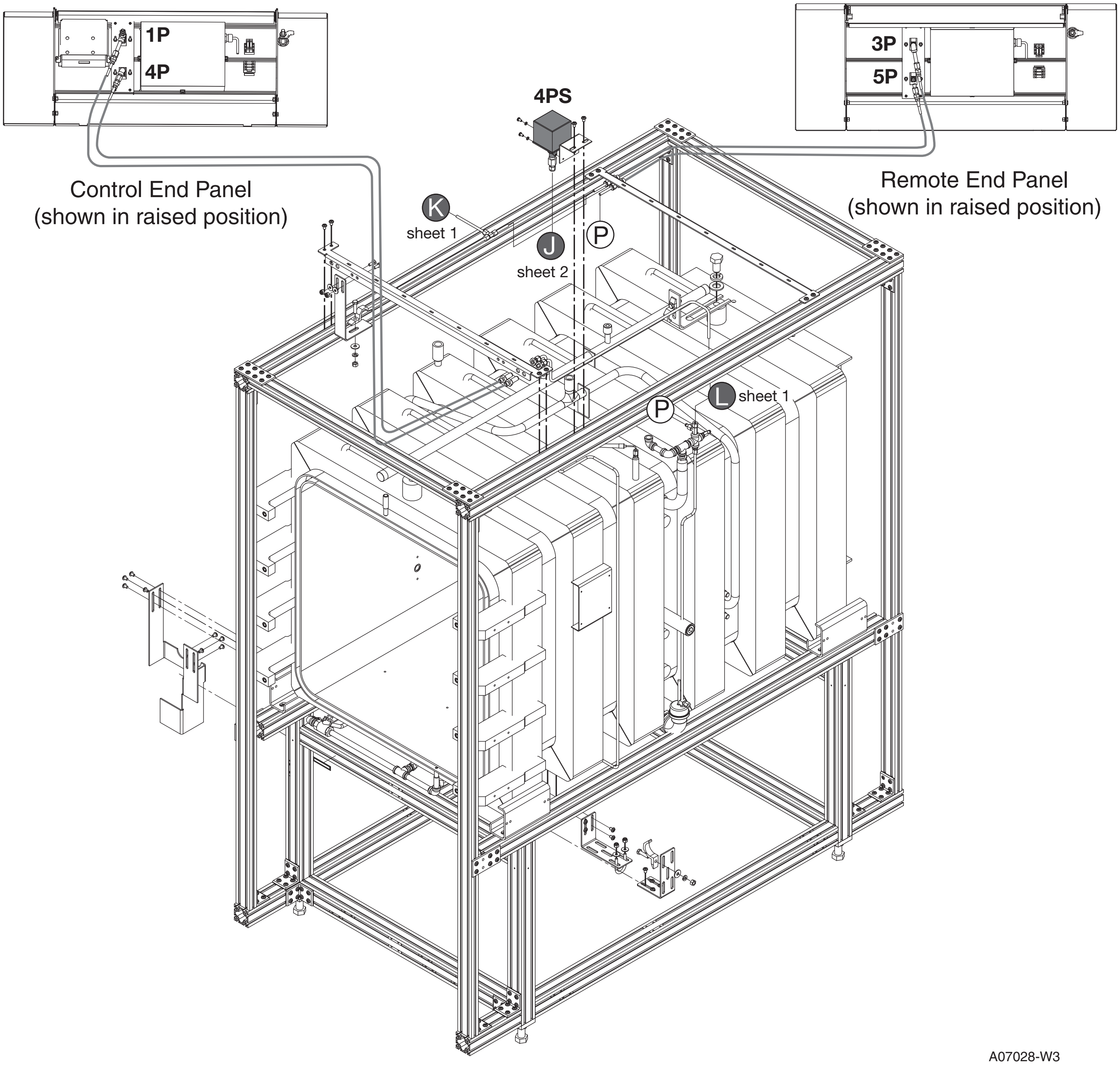
A07028-W2

FIGURE 7–4, SHEET 3. PIPING PACKAGE, 51" UNITS

LEGEND

Ⓟ Connector on this sheet

Ⓙ Connector on other sheet


1P
4P
Control End Panel
(shown in raised position)
3P
5P
Remote End Panel
(shown in raised position)
4PS
K
sheet 1
J
sheet 2
P
P
L
sheet 1

A07028-W3

FIGURE 7–5. CLOSURE PACKAGE

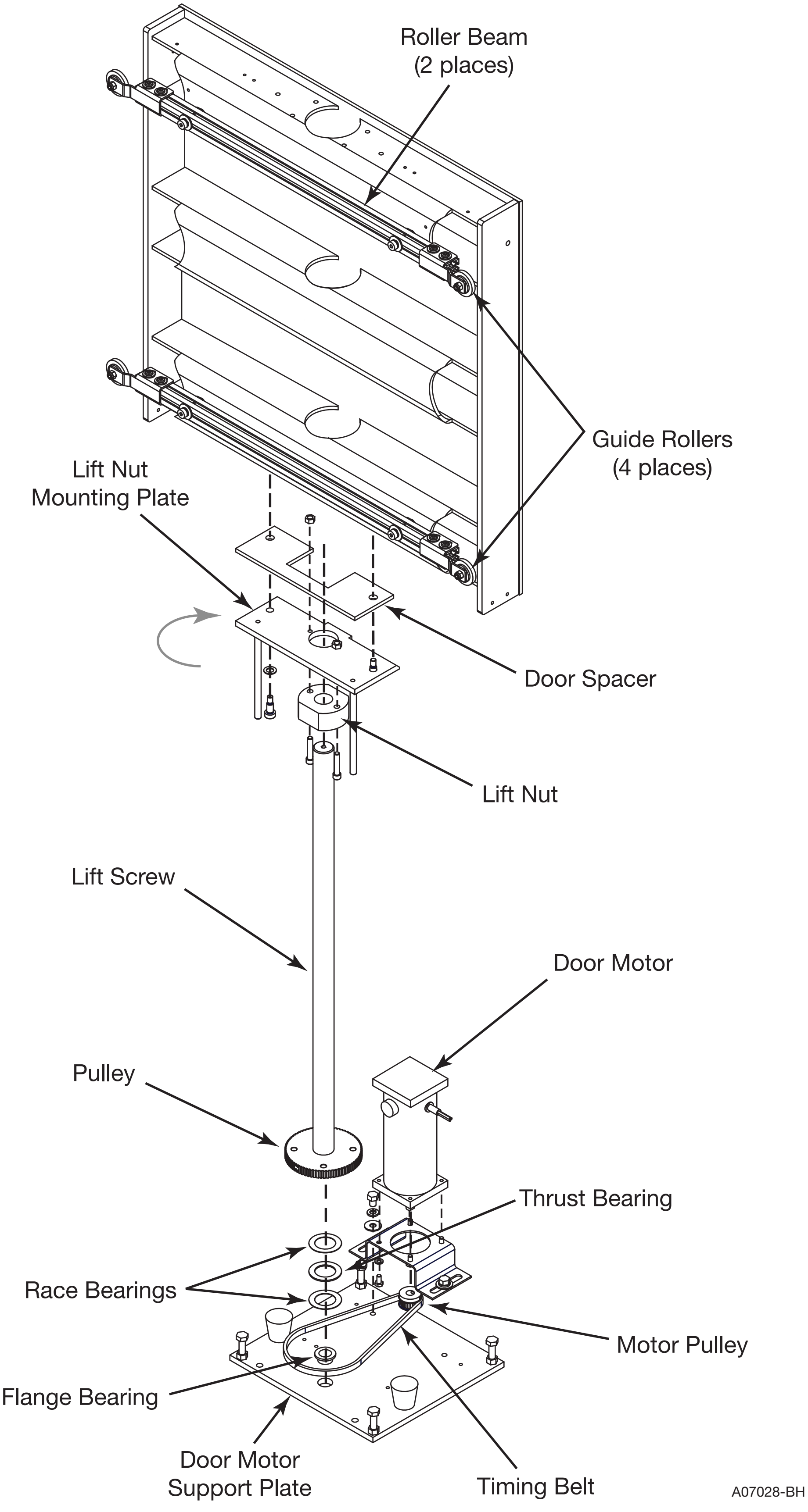
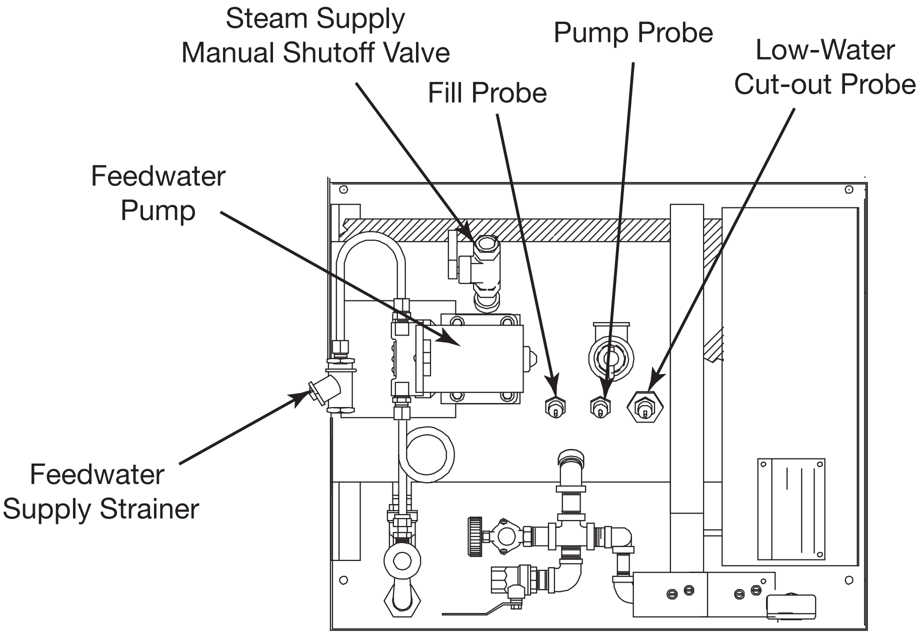
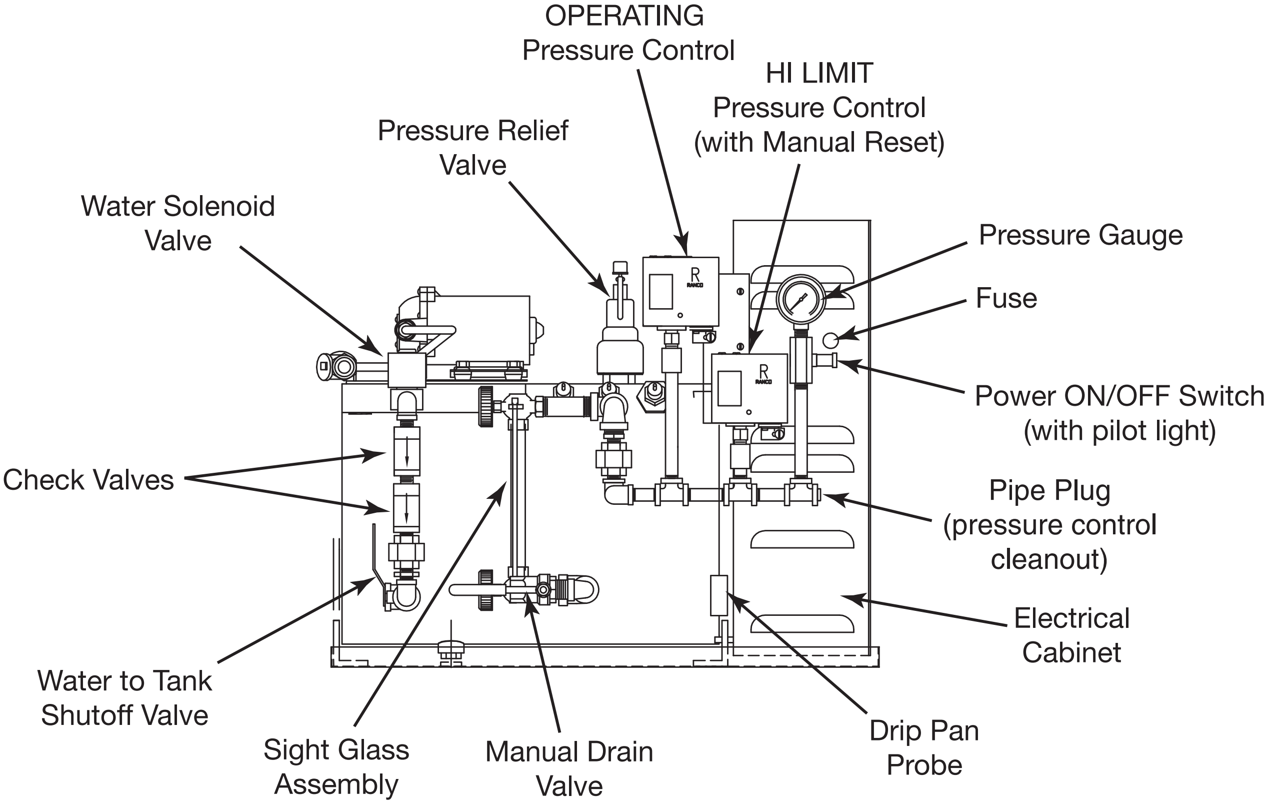

Roller Beam
(2 places)
Guide Rollers
(4 places)
Lift Nut
Mounting Plate
Door Spacer
Lift Nut
Lift Screw
Door Motor
Pulley
Thrust Bearing
Race Bearings
Motor Pulley
Flange Bearing
Door Motor
Support Plate
Timing Belt
A07028-BH

FIGURE 7–6, SHEET 1. GTS-30A STEAM BOILER


Steam Supply Manual Shutoff Valve
Pump Probe
Low-Water Cut-out Probe
Fill Probe
Feedwater Pump
Feedwater Supply Strainer

TOP VIEW

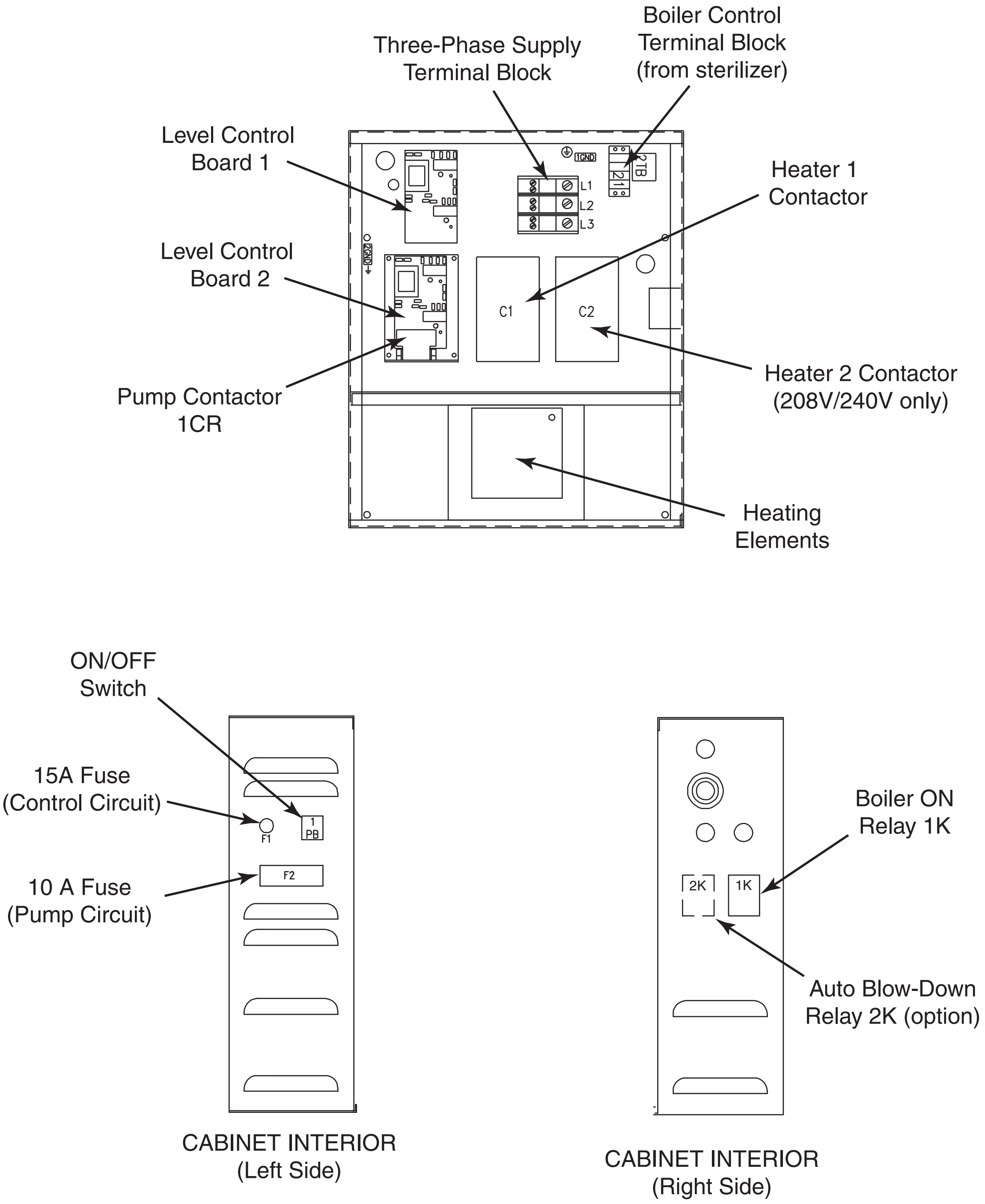

OPERATING Pressure Control
HI LIMIT Pressure Control (with Manual Reset)
Pressure Relief Valve
Water Solenoid Valve
Pressure Gauge
Fuse
Power ON/OFF Switch (with pilot light)
Check Valves
Pipe Plug (pressure control cleanout)
Electrical Cabinet
Water to Tank Shutoff Valve
Sight Glass Assembly
Manual Drain Valve
Drip Pan Probe

FRONT VIEW

A07028-AT

FIGURE 7–6, SHEET 2.   GTS-30A STEAM BOILER

☞ See optional equipment wiring diagram W1306 for wiring of Automatic Blow-Down Package.

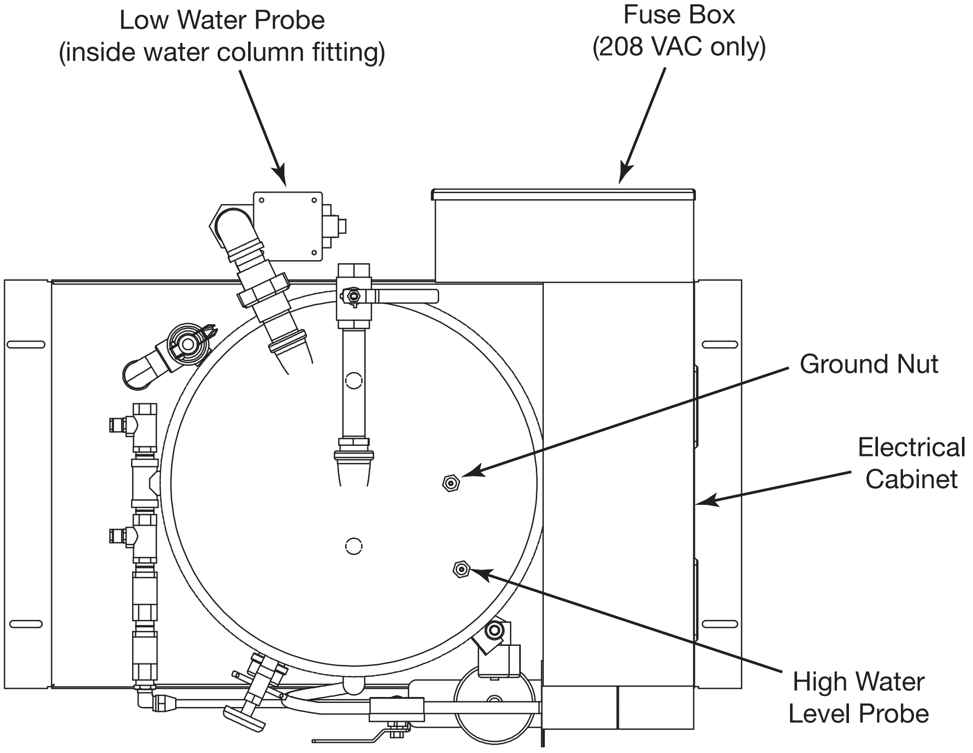

Three-Phase Supply Terminal Block
Boiler Control Terminal Block (from sterilizer)
Level Control Board 1
Heater 1 Contactor
Level Control Board 2
Pump Contactor 1CR
Heater 2 Contactor (208V/240V only)
Heating Elements
1GND
2GND
2TB
L1
L2
L3
C1
C2
ON/OFF Switch
15A Fuse (Control Circuit)
10 A Fuse (Pump Circuit)
F1
1 PB
F2
Boiler ON Relay 1K
Auto Blow-Down Relay 2K (option)
2K
1K

CABINET INTERIOR (Left Side)

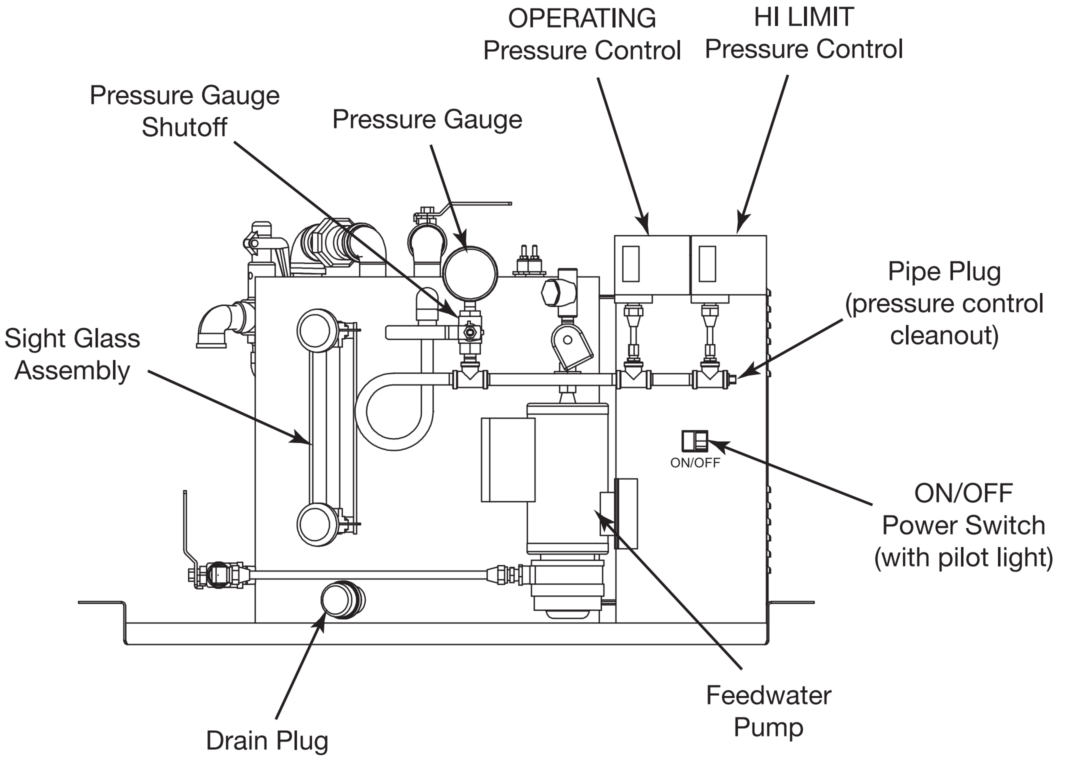
CABINET INTERIOR (Right Side)

A07028-BP

FIGURE 7–7, SHEET 1. CAS-45A STEAM BOILER


Low Water Probe
(inside water column fitting)
Fuse Box
(208 VAC only)
Ground Nut
Electrical
Cabinet
High Water
Level Probe

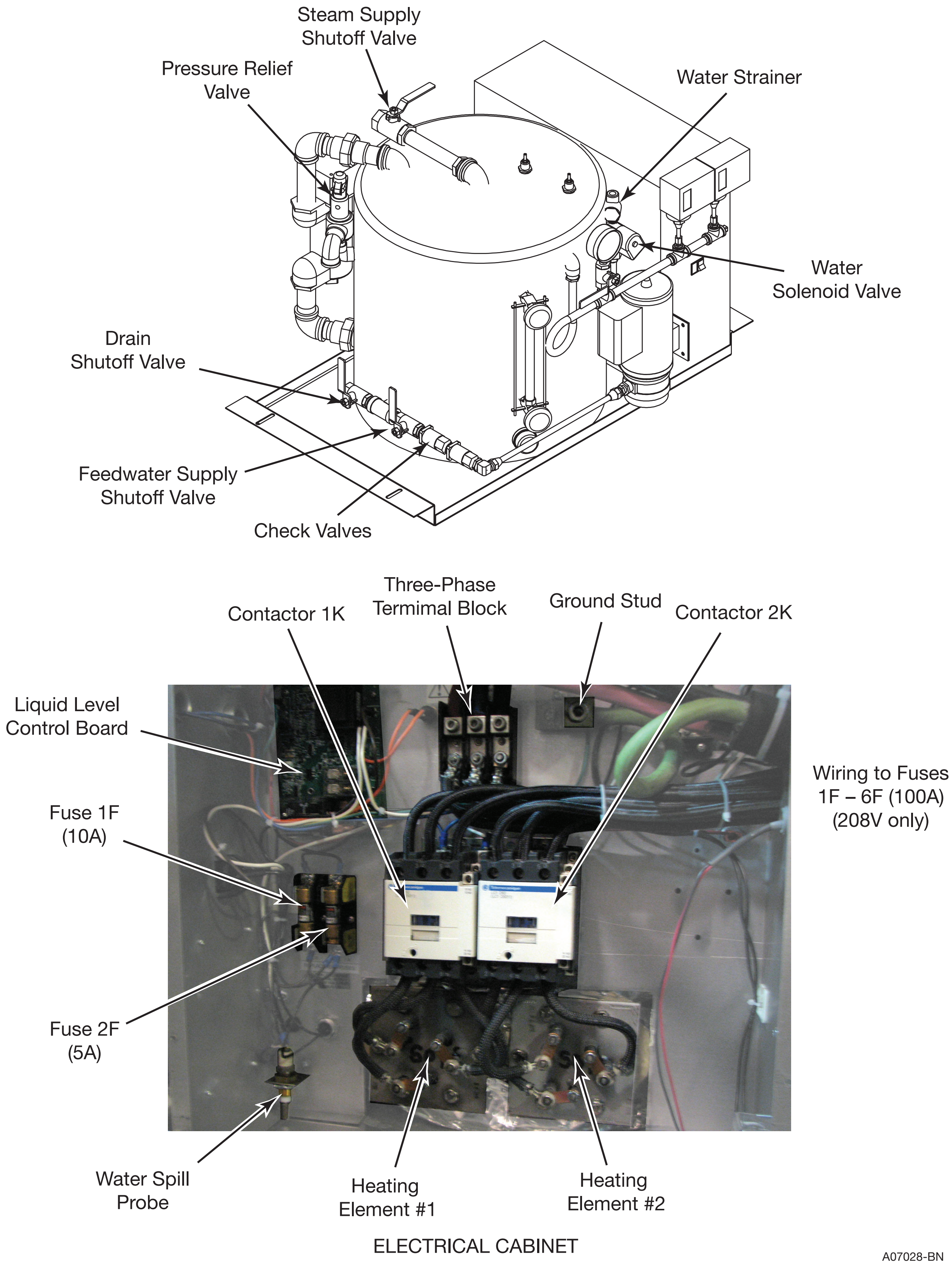
TOP VIEW


OPERATING
Pressure Control
HI LIMIT
Pressure Control
Pressure Gauge
Shutoff
Pressure Gauge
Sight Glass
Assembly
Pipe Plug
(pressure control
cleanout)
ON/OFF
ON/OFF
Power Switch
(with pilot light)
Feedwater
Pump
Drain Plug

FRONT VIEW

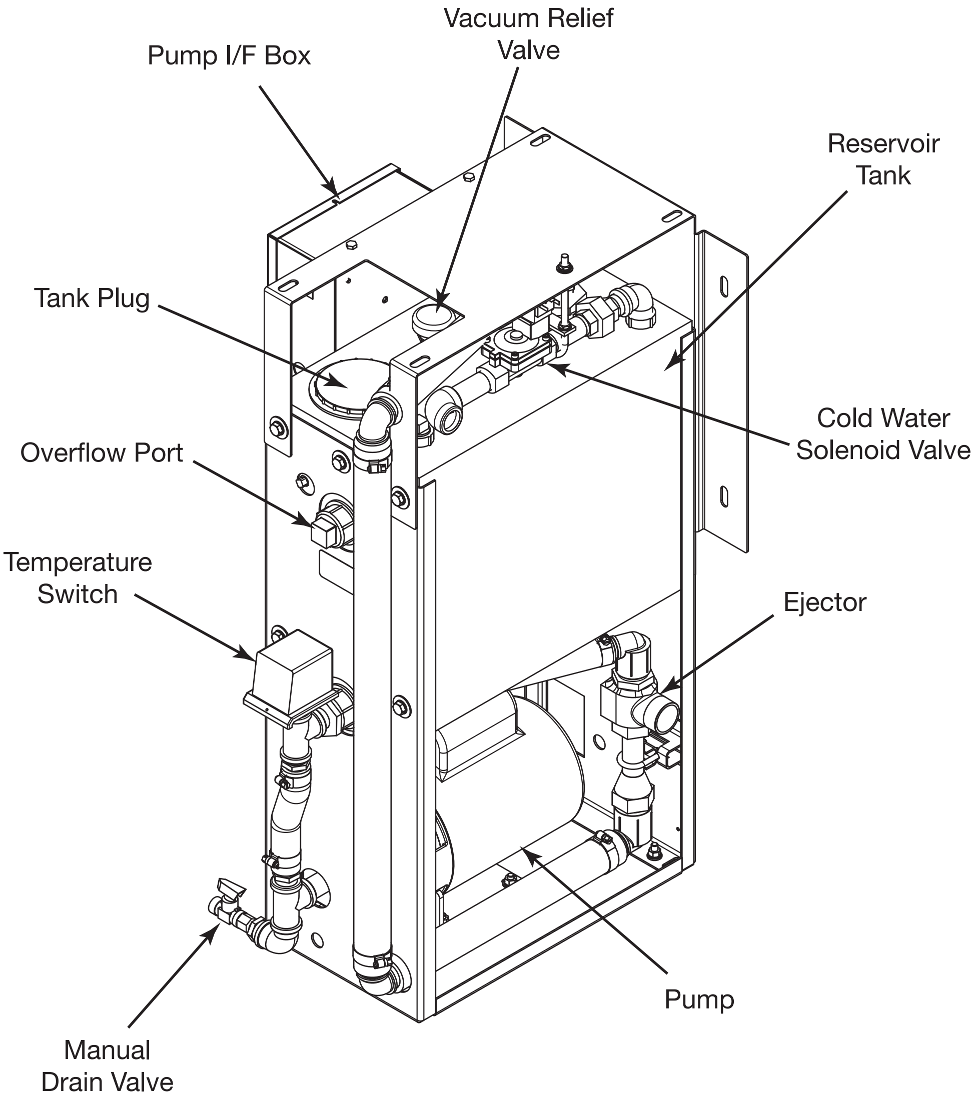
A07028-AU

FIGURE 7–7, SHEET 2. CAS-45A STEAM BOILER


Steam Supply Shutoff Valve
Pressure Relief Valve
Water Strainer
Water Solenoid Valve
Drain Shutoff Valve
Feedwater Supply Shutoff Valve
Check Valves
Three-Phase Termimal Block
Contactor 1K
Ground Stud
Contactor 2K
Liquid Level Control Board
Wiring to Fuses 1F – 6F (100A) (208V only)
Fuse 1F (10A)
Fuse 2F (5A)
Water Spill Probe
Heating Element #1
Heating Element #2
A07028-BN

ELECTRICAL CABINET

FIGURE 7–8. MP-129F WATER-SAVER


Pump I/F Box
Vacuum Relief Valve
Reservoir Tank
Tank Plug
Overflow Port
Cold Water Solenoid Valve
Temperature Switch
Ejector
Pump
Manual Drain Valve
A07028-AV

RECOMMENDED SPARE PARTS LIST

CONSUMABLE STOCK

Consumable items are listed in Table 7–1

TABLE 7–1. CONSUMABLE STOCK

Description	Part No.
Air-In Filter	61301600303
Door Gasket	61301609936
Synthetic Lubricant	61301605061

NOTE

For part numbers for filters used in the Water Treatment System, see Parts Catalog PN 61301607029.

SPARE PARTS

Recommended spare parts and rebuild kits are listed in Table 7–2. Maintaining a stock of spare parts reduces equipment downtime by ensuring parts are available when needed.

TABLE 7–2. RECOMMENDED SPARE PARTS

Description	Reference Designator	Type	Rating	Part No.
Sensor, Temperature, RTD, 100 ohm	1RT, 2RT, 5RT	—	—	61301600638
Transducer, Pressure	1PT	—	—	61301609710
PC Board, CM10	2A2U	—	—	61301609707
PC Board, CPU	2A3U	—	—	61301608297
Display Assembly, OP30	3A, 5A	—	—	61301608168
Screen, Drain, Main	—	—	—	61301608230
Drain Assembly, Bleed	—	—	—	61301607166
Fuses, Power Box	1F	T/SB	5.0A 250V	530837
	2F	T/SB	4.0A 250V	61301600655
	3F	T/SB	8.0A 250V	530838
	4F	T/SB	2.5A 250V	61301600654
	5F	T/SB	2.5A 250V	61301600654
	6F	T/SB	2.5A 250V	61301600654
Fuse, Steam Boiler, GTS-30A, Optional	1F, 2F		15A	61301607124

TABLE 7–2. RECOMMENDED SPARE PARTS

Description	Reference Designator	Type	Rating	Part No.
Fuse, Steam Boiler, CAS-45A, Optional	1F 2F 1F (208V only) 2F (208V only) 3F (208V only) 4F (208V only) 5F (208V only) 6F (208V only)		10A,250V 5A,250V 100A,250V 100A,250V 100A,250V 100A,250V 100A,250V 100A,250V	61301608593 61301607484 61301607486 61301607486 61301607486 61301607486 61301607486 61301607486
Fuse, Integral Transformer, Optional	1F	T/SB	5.0A 250V	530837

SECTION 8 TROUBLE ANALYSIS

INTRODUCTION

The sterilizer software has a built-in diagnostic feature that generates a diagnostic message when a malfunction or out-of-tolerance condition occurs.

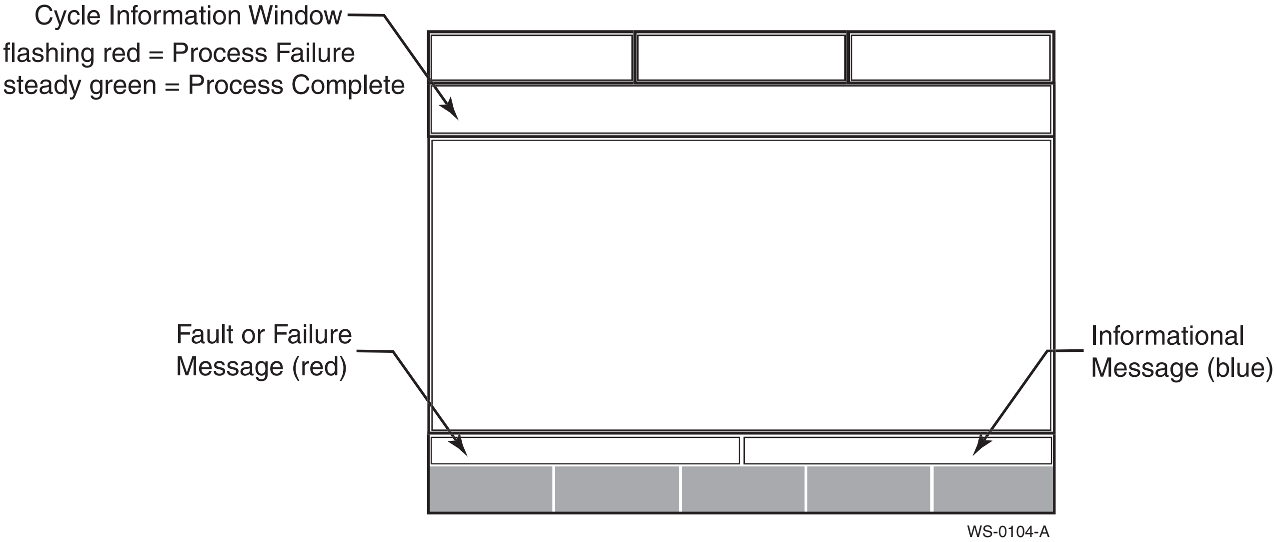
Diagnostic messages are grouped into three categories:

- failure conditions—*see "Failure Conditions" on page 8–2*.
- fault conditions—*see "Fault Conditions" on page 8–2*.
- informational messages—*see "Informational Messages" on page 8–2*.

VISUAL ALARMS

The cycle complete information window indicates the Process Failure and Process Complete conditions.

FIGURE 8–1. CYCLE INFORMATION WINDOW


Cycle Information Window
flashing red = Process Failure
steady green = Process Complete
Fault or Failure Message (red)
Informational Message (blue)
WS-0104-A

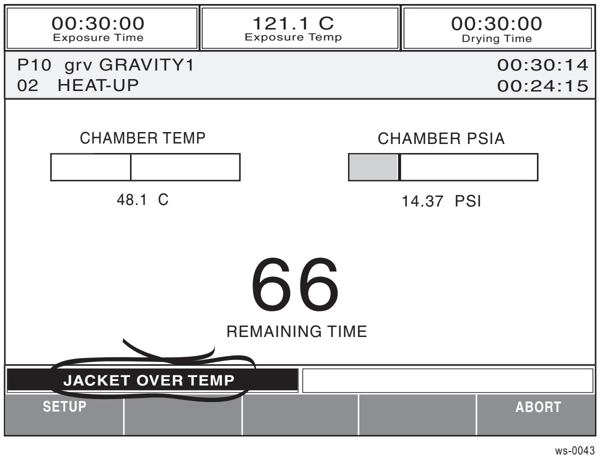
When a process failure occurs, the cycle information window changes to red and flashes until the alarm is cleared. (This feature is associated with the PROCESS FAILURE indicator.)

When the cycle is complete, the cycle information window changes to green. The cycle information window returns to normal when the door is opened. (This feature is associated with the PROCESS COMPLETE indicator.)

FAILURE CONDITIONS

Failure conditions are indicated by a flashing Process Failure light and pulsing alarm tone (exceptions are noted in diagnostic message table). Failure messages appear in the lower left of the display screen and are highlighted in red (see Figure 8–2). When a failure occurs, the controls automatically cancel the cycle.

FIGURE 8–2. FAILURE MESSAGE



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time
P10 grv GRAVITY1 00:30:14
02 HEAT-UP 00:24:15
CHAMBER TEMP 48.1 C
CHAMBER PSIA 14.37 PSI
66 REMAINING TIME
JACKET OVER TEMP

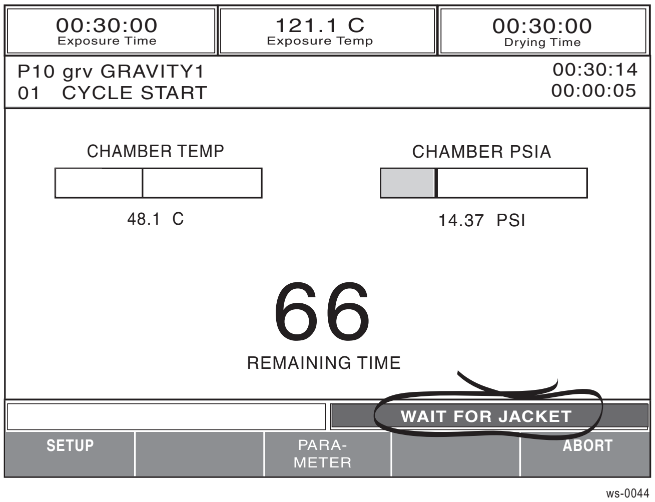
FAULT CONDITIONS

Fault conditions are less severe than a process failure and are indicated by a steady alarm tone (exceptions are noted in diagnostic message table). Fault messages appear in the lower left of the display screen and are highlighted in red. The sterilizer is usually able to complete the cycle if a fault occurs.

INFORMATIONAL MESSAGES

Informational messages alert the operator to pertinent conditions. Informational messages appear in the lower right of the display screen and are highlighted in blue (see Figure 8–3). The message clears automatically when the condition is corrected.

FIGURE 8–3. INFORMATIONAL MESSAGE



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:30:14

01 CYCLE START 00:00:05

CHAMBER TEMP 48.1 C

CHAMBER PSIA 14.37 PSI

66 REMAINING TIME

WAIT FOR JACKET

SETUP
PARA-
METER
ABORT
ws-0044

DISPLAY MESSAGES

DIAGNOSTIC MESSAGES

Each diagnostic message table presented in this section describes the problem and the possible corrective actions, in the following format:

MESSAGE	PROBLEM	CORRECTIVE ACTION
Message Text (alarm type—pulsing or steady)	Explanation of Failure or Fault Condition (message type—failure or fault))	Level 1 troubleshooting: These procedures should be performed before checking piping or electrical components.
		Level 2 troubleshooting: These procedures involve checking piping or electrical components and cleaning, repairing, or replacing them as necessary.

When a failure or fault condition occurs, the PROCESS FAILURE indicator flashes and an alarm sounds. Failure and fault messages are also printed out and added to the error log.

To clear the message and silence the alarm, press the CLEAR/ALARM switch.

NOTE

Piping and electrical components are assigned reference designators (such as 1SV, 1RT, etc.). Refer to Section 7—Component Locations for location of components.

Refer to Section 6—Engineering Drawings for piping and instrument drawing (P&ID), wiring diagrams, and electrical schematics.

Refer to Figure 6–17, Sheet 3 on page 6–38 for steam and water supply requirements.

Failure and fault messages are listed in Table 8–1. Failure and fault messages are indicated by red text except where noted.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
ABORT-AIR REMOVAL (pulsing alarm)	Negative pulse subphase exceeded 30 minutes. Process Failure — Auto Abort	Check the following: • Water supply turned on? • Water supply pressure adequate (see roughing-in drawing)? • Door gasket damaged? • Chamber drain sediment screen clogged? • Water supply strainer clogged?
		If the problem persists, proceed as follows: • Clean or replace ejector. • Clean or repair Water to Ejector valve 6SV. • Clean or repair Steam to Chamber valve 1SV. • Clean or repair Chamber Drain valve 2SV. • Clean or repair Air-In valve 3SV. • Check for loose pipe fittings. • Check Chamber Pressure transducer 1PT. • Check CM10 Board 2A2U.
ABORT-CNTRLS OFF (pulsing alarm)	633LS Only: User turned the controls off, then on again during a cycle. Process Failure — Auto Abort	Failure not caused by equipment malfunction.
ABORT-DOOR SW (pulsing alarm)	Door sealed or door closed input lost during cycle. Process Failure — Auto Abort	Proceed as follows: • Check and adjust door closed and door open limit switches. Replace if necessary. • Check and adjust pressure switch 4PS. Replace if necessary. • Check CM10 Board 2A2U.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
ABORT-EXH SLOWED (pulsing alarm)	Exhaust time exceeded 30 minutes during gravity cycle. Process Failure — Auto Abort	Check the following: • Chamber drain screen clogged? • Water supply pressure adequate? • Door gasket damaged?
		If problem persists, proceed as follows: • Clean or repair Chamber Drain valve 2SV. • Clean or repair Steam to Chamber valve 1SV. • Check Chamber Pressure transducer 1PT. • Check CM10 Board 2A2U.
ABORT-HEAT-UP (pulsing alarm)	Heat-up time exceeded: • 60 minutes (non-liquid cycle). • 90 minutes (liquid cycles). Process Failure — Auto Abort	Check the following: • Steam supply turned on? • Steam supply adequate? • Steam supply strainer clogged? • Oversized load?
		If problem persists, proceed as follows: • Clean or repair Jacket Steam valve 8SV. • Clean or repair Steam to Chamber valve 1SV. • Clean or repair Chamber Drain valve 2SV. • Check Chamber RTD 1RT • Check Load Probe 3RT. • Check CM10 Board 2A2U.
ABORT-HIGH TEMP (pulsing alarm)	Chamber temperature exceeded the set point plus 10.0°F (5.6°C). Process Failure — Auto Abort	Proceed as follows: • Clean or repair Steam to Chamber valve 1SV. • Clean or repair Jacket Steam valve 8SV. • Check gasket for leak into chamber. • Check Chamber Drain valve 2SV and/or Water to Ejector valve 6SV. • Check Chamber Drain RTD 1RT. • Check Load Probe 3RT • Check CM10 Board 2A2U.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
ABORT-LOW TEMP (pulsing alarm)	633LS Only: Chamber temperature more than 5.0°C below set point during exposure. Process Failure — Auto Abort	Check the following: • Steam supply turned on? • Steam supply adequate? • Chamber drain screen clogged? • Oversized load?
		If problem persists, proceed as follows: • Clean or replace jacket steam trap. • Check Chamber Probe 1RT.
ABORT-LIQexh SLOW (pulsing alarm)	Liquid exhaust phase exceeded 4 hours. Process Failure — Auto Abort	Check the following: • Chamber drain screen clogged? • Water supply pressure adequate? • Door gasket damaged?
		If problem persists, proceed as follows: • Clean or repair Chamber Drain valve 2SV. • Clean or repair Steam to Chamber valve 1SV. • Check Chamber Pressure transducer 1PT. • Check CM10 Board 2A2U.
ABORT-SLOW STEAM (pulsing alarm)	Positive pulse subphase exceeded 30 minutes. Process Failure — Auto Abort	Check the following: • Steam turned on? • Steam supply pressure adequate? • Steam supply strainer clogged?
		If the problem persists, proceed as follows: • Clean or repair Steam to Chamber valve 1SV. • Clean or repair Chamber Drain valve 2SV. • Clean or repair Jacket Steam valve 8SV. • Clean or repair steam supply steam trap 2TR. • Adjust door switch (or replace if defective). • Check Jacket RTD 2RT. • Check Chamber Pressure transducer 1PT. • Check CM10 Board 2A2U.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
AIR-IN SLOW (steady alarm; PROCESS COMPLETE and PROCESS FAILURE indicators are both OFF)	Air-in phase exceeded 30 minutes.	Replace the air-in filters.
BATTERY LOW	Low battery.	Replace CPU Board 2A1U.
CE NOT CLOSED (steady alarm/blue message)	Control end door did not close before door close timer expired. Digital input DI 01 CE Not Closed is ON.	Check the following: • Connections to CE Door I/F Box 15A • CE Door Close switch 3S. • CE Door Motor circuit. • CM10 PC Board 2A2U.
CE NOT OPENED (steady alarm/blue message)	Control end door did not open before door open timer expired. Digital input DI 01 CE Open is OFF.	Check the following: • Connections to CE Door I/F Box 15A • CE Door Open switch 22S. • CE Door Motor circuit. • CM10 PC Board 2A2U.
CE NOT SEALED (steady alarm/blue message)	Control end door did not seal before door seal timer expired. Digital input DI 02 CE (RE) Sealed is OFF. Alarm clears automatically if seal is attempted again.	Proceed as follows: • Check the door gasket and replace if damaged. • Check steam supply pressure. • VACUUM TO DOOR(S) hand valve open?
		If the problem persists, proceed as follows: • Check chamber pressure switch 4S. • Clean or replace Door(s) Seal valve 10SV. • Clean steam supply strainer 1ST. • Check CM10 PC Board 2A2U. • Check Display Panel 3A.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
CE NOT UNSEALED (steady alarm/blue message)	Control end door did not unseal before door unseal timer expired. Digital input CE (RE) Sealed is ON. Alarm clears automatically if unseal is attempted again)	Proceed as follows: • Reset the control system: (1) turn the power OFF, (2) wait 60 seconds, then (3) turn the power ON again. • Check the door gasket and replace if necessary. • STEAM TO DOOR(S) hand valve open?
		If the problem persists: • Check chamber pressure switch 4S. • Clean or replace Door(s) Unseal valve 12SV. • Check CM10 Board 2A2U. • Check Display Panel 3A.
CHAM RTD ERROR (pulsing alarm)	Chamber temperature analog input not found by process control module. Process Failure — Auto Abort	Proceed as follows: • Check Chamber RTD 1RT. • Check CM10 Board 2A2U.
CHECK BCT VALUES (pulsing alarm)	633HC Only: During standby, the chamber pressure exceeded the highest value the transducer can read and a PRESS ERROR did not occur.	If the problem persists: • Check pressure transducer 1PT. • Check CM10 Board 2A2U.
DI 00-07 COM ERR (pulsing alarm)	Digital input module has lost communication with process control module. Process Failure — Auto Abort	Proceed as follows: • Check CM10 Board 2A2U • Check CPU Board 2A1U
DI 08-15 COM ERR (pulsing alarm)	Digital input module has lost communication with process control module. Process Failure — Auto Abort	Proceed as follows: • Check CM10 Board 2A2U • Check CPU Board 2A1U
DO 00-07 COM ERR (pulsing alarm)	Digital output module has lost communication with process control module. Process Failure — Auto Abort	Proceed as follows: • Check CM10 Board 2A2U • Check CPU Board 2A1U
DO 08-15 COM ERR (pulsing alarm)	Digital output module has lost communication with process control module. Process Failure — Auto Abort	Proceed as follows: • Check CM10 Board 2A2U • Check CPU Board 2A1U

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
DO 16-23 COM ERR (pulsing alarm)	Digital output module has lost communication with process control module. Process Failure — Auto Abort	Proceed as follows: • Check CM10 Board 2A2U • Check CPU Board 2A1U
DOOR OBSTRUCTION (steady alarm)	Photo eye light beam is interrupted. Digital inputs CE Not Obstructed (DI 03) and/or RE Not Obstructed (DI 07) are OFF. Alarm clears automatically when obstruction is removed.	Check door(s) for obstruction (object on top of door cover).
		If the problem persists: • Check photo eye transmitters and receivers 1LE/1LE and 2LE/2LR. • Check connections to Door I/F Boxes 15A and 16A. • Check CM10 Board 2A2U.
DOOR SWITCH FAIL (steady alarm)	Door(s) Sealed (DI 02) and CE Not Closed (DI 01) inputs are ON at the same time. Door(s) Sealed (DI 02) and RE Not Closed (DI 05) inputs are on at the same time. RE Sealed (DI 06) and RE Not Closed (DI 05) inputs are on at the same time.	Check for obstruction.
		If the problem persists, proceed as follows: • Check and replace door switches. • Check CM10 Board 2A2U.
DOORS NOT SEALED (steady alarm/blue message)	Doors did not seal before door seal timer expired. Digital input DI 02 CE (RE) Sealed is OFF. Alarm clears automatically if seal is attempted again.	Proceed as follows: • Check both door gaskets and replace if damaged. • Check steam supply pressure. • VACUUM TO DOOR(S) hand valve open?
		If the problem persists, proceed as follows: • Check Door(s) Sealed pressure switch 4S. • Clean or replace Door(s) Seal valve 10SV. • Clean steam supply strainer 1ST. • Check CM10 Board 2A2U. • Check Display Panels 3A and 5A.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
DOORS NOT UNSLD (steady alarm/blue message)	Doors did not unseal before door unseal timer expired. Digital input CE (RE) Sealed (DI 02) is ON. Alarm clears automatically if unseal is attempted again.	Proceed as follows: • Reset the control system: (1) turn the power OFF, (2) wait 60 seconds, then (3) turn the power ON again. • Check both door gaskets and replace if necessary. • STEAM TO DOOR(S) hand valve open?
		If the problem persists: • Check Door(s) Sealed pressure switch 4S. • Clean or replace Door (s) Unseal valve 12SV. • Check CM1 Board 2A2U. • Check Display Panels 3A and 5A.
DWELL TEMP LOW (steady alarm)	Chamber temperature fell below set point minus 1.1°C (2.0°F). The dwell phase timer is suspended until the temperature is above the exposure set point.	Check the following: • Steam supply turned on? • Steam supply adequate? • Chamber sediment screen clogged?
		If the problem persists, proceed as follows: • Chamber RTD 1RT. • Load Probe 3RT. • Jacket steam trap 1TR.
EXPOSE TEMP LOW (steady alarm)	633LS Only: Chamber temperature during exposure phase fell below the set point minus 1.1°C (2.0°F). The exposure timer is suspended until the temperature is above the exposure set point.	Check the following: • Steam supply turned on? • Steam supply adequate? • Chamber sediment screen clogged?
		If the problem persists, proceed as follows: • Chamber RTD 1RT. • Load Probe 3RT. • Jacket steam trap 1TR.
JACKET OVER-TEMP (pulsing alarm)	Jacket temperature exceeded 141.0°C (285.8°F) or 139.4°C (282.9°F) during leak test cycle. Process Failure — Auto Abort	Proceed as follows: • Clean or repair Jacket Steam valve 8SV. • Clean or rebuild jacket steam trap 1TR. • Check Jacket RTD 2RT. • Check CM10 Board 2A2U.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
JKT RTD ERROR (pulsing alarm)	Jacket temperature analog input not found by process control module Process Failure — Auto Abort	Proceed as follows: • Check Jacket RTD 2RT. • Check CM10 Board 2A2U.
LD PRB RTD ERROR (pulsing alarm)	633LS Only: Load temperature analog input not found by process control module. Process Failure — Auto Abort	Proceed as follows: • Check Load RTD 3RT. • Check CM10 Board 2A2U.
LEAK TEST FAIL (pulsing alarm)	The unit failed the vacuum leak test.	Clean or replace the door gasket.
	Possible reasons for failure: • Leak rate greater than 0.78 psi/15 minute (40.34 mm Hg/min). • Chamber pressure at end of test exceeded 4.75 psi.	If the problem persists, proceed as follows: • Clean or repair Steam to Chamber valve 1SV. • Clean or repair Air-In valve 3SV. • Clean or repair chamber drain check valve(s) 2CV and 5CV. • Check Chamber Pressure transducer 1PT. • Check CM1 Board 2A2U.
OBSTRUCTION SW FAIL (steady alarm)	CE Not Obstructed (DI 03) or RE Not Obstructed (DI 07) is seen after 1 second during the closing phase.	Check the following: • photo eye connections to Door I/F Box 15A/16A • CE photo eye circuit 1LE/1LR • RE photo eye circuit 2LE/2LR • amplifier module 15A2U/16A2U.
POWER FAILED (pulsing alarm)	Power was interrupted for more than 60 seconds while in cycle. Process Failure — Auto Abort	No action required.
PRESS ERROR (pulsing alarm)	Chamber pressure analog input not found by process control module. Process Failure — Auto Abort	Proceed as follows: • Check Chamber Pressure transducer 1PT. • Check CM10 PC Board 2A2U
PRESS IN CHAMBER (steady alarm)	Chamber pressure not within 2 psi of atmospheric pressure while in standby mode. Controls will automatically clear fault when chamber pressure is within 2 psi.	Proceed as follows: • Check the manual pressure gauge to verify chamber pressure. • Reset the controls: (1) turn the power OFF, (2) wait 60 seconds, then (3) turn the power ON again. • When the READY message is displayed, attempt to unseal the door.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
RE NOT CLOSED (blue text and steady alarm)	Remote end door did not close before door close timer expired. Digital input DI 05 RE Not Closed is ON.	Check the following: • Connections to Door I/F Box 16A • RE Door Close SW 7S. • RE Door Motor circuit. • Check CM10 PC Board 2A2U.
RE NOT OPENED (blue text and steady alarm)	Remote end door did not open before door open timer expired. Digital input DI 04 RE Open is OFF.	Check the following: • Connections to Door I/F Box 16A • RE Door Open SW 27S. • RE Door Motor circuit. • Check CM1 PC Board 2A2U.
RE NOT SEALED (blue text and steady alarm	633LS with Unidirectional Doors or Door Seal interlock option only: Control end door did not seal before door seal timer expired. Digital input DI 06 RE Sealed is OFF. Alarm clears automatically if seal is attempted again.	Proceed as follows: • Check the door gasket and replace if damaged. • Check steam supply pressure. • VACUUM TO DOOR(S) hand valve open?
		If the problem persists, proceed as follows: • Check chamber pressure switch 4S. • Clean or replace RE Door Seal valve 11SV. • Clean steam supply strainer 1ST. • Check CM10 PC Board 2A2U. • Check Display Panel 3A.
RE NOT UNSEALED (blue text and steady alarm)	633LS with Unidirectional Doors or Door Seal interlock option only: Remote end door did not unseal before door unseal timer expired. Digital input DI 06 RE Sealed is ON. Alarm clears automatically if unseal is attempted again)	Proceed as follows: • Reset the control system: (1) turn the power OFF, (2) wait 60 seconds, then (3) turn the power ON again. • Check the door gasket and replace if necessary. • STEAM TO DOOR(S) hand valve open?
		If the problem persists: • Check chamber pressure switch 4S. • Clean or replace RE Door Unseal valve 13SV. • Check CM10 Board 2A2U. • Check Display Panel 3A.

TABLE 8–1. FAILURE AND FAULT MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
RESET-TEMP LOW (steady alarm)	633HC Only: Temperature during exposure phase below the set point minus 4°C (7°F). The cycle is reset to Heat-Up phase.	Check the following: • Steam supply turned on? • Steam supply adequate? • Chamber drain screen clogged?
		If the problem persists, proceed as follows: • Replace the steam trap(s).
WATER IN DRAIN (pulsing alarm) See Warning below.	The drain float switch detected water in the chamber drain (contacts opened for 11 seconds). Door cannot be unsealed. Fault will clear automatically when water has drained. Process Failure — Auto Abort	Proceed as follows: • Replace steam traps. • Clean or repair chamber drain check valve 5CV. • Check steam quality meets requirements on roughing-in drawing. • Repair or replace Liquid Level switch 5S. • Check CM10 Board 2A2U.

WARNING

HOT WATER: If a WATER IN DRAIN message is displayed, DO NOT open the chamber door manually. Hot water in the chamber may spill out if the door is opened. Wait until the message clears before attempting to open the door.

INFORMATIONAL MESSAGES

Informational messages are listed in Table 8–2.Informational messages are indicated by blue text except where noted.

TABLE 8–2. INFORMATIONAL MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
ABORT—CNTRLS OFF (red message)	633HC only: CONTROLS ON/ OFF switch was pressed during a cycle.	The load must be repackaged and reprocessed.
ABORT MANUAL (red message)	Operator aborted the cycle by pressing the [ABORT] softkey.	Message will clear automatically when the abort sequence is completed.
CE DOOR OPEN	Operator pressed START with the control end door was opened.	Message will clear when door is closed.
CYCLE ABORTED	The aborted cycle has ended. (printed message only)	Understand that the cycle is deemed unsuccessful and the load was not sterilized.
CYCLE ADVANCED	Operator pressed [PHS ADV] softkey to manually advance the cycle. Message will clear when cycle has advanced through all the phases.	If the cycle advance feature is used, the cycle must be considered incomplete and the load must be repackaged and reprocessed.
CYCLE RESULTS	The cycle was completed successfully. (printed message only)	Review this section of the printout to ensure the cycle ran as expected.
HEATING GASKET	Gasket is being flushed.	Message will clear when Gasket Heat Time is complete.
INVALID CONFIG	Settings on DIP SWITCHES menu are configured wrong.	Check DIP SWITCHES screen to see if the following switch combinations are selected: • Single door (DS01=0) and a door interlock option (DS02=1 or DS03=1 or DS04=1) • More than one door interlock option is selected (DS02=1 and/or DS03=1 and/or DS04=1) • More than one vessel length (DS16=1 and/or DS17=1 and/or DS18=1) • Vacuum Pump (DS10=1) and Water Saver (DS14=1) See *“DIPSWITCHES Screen” on page 5–48*.

TABLE 8–2. INFORMATIONAL MESSAGES

MESSAGE	PROBLEM	CORRECTIVE ACTION
LOW CYCLE VALUES (red message)	Settings for selected cycle are below the parameter check limit.	Select a cycle with settings that are equal to or above the default factory settings.
	The LOW CYCLE VALUES message does not prevent the cycle from being started.	Message will clear when a cycle that meets the parameter check limit is selected or when START is pressed.
LOW POWER BROWN OUT	Printer message.	Occasionally, with the introduction of AC power to the sterilizer, the message “LOW POWER BROWN OUT” may occur on the printout. This message should be disregarded.
MANUAL MODE	One or more digital outputs are set to manual mode.	POSSIBILITY OF INJURY: Manual mode is intended for use by service technicians to check the function of individual outputs. Attempting to operate the sterilizer when any output is set for manual operation may result in possibly dangerous conditions.
		Check that all outputs on the TEST DIGITAL OUT screen are set to AUTO.
NEG. TRANS PT.	A negative conditioning pulse was achieved successfully. (printed only)	No operator action required.
POS. TRANS PT.	A positive conditioning pulse was achieved successfully. (printed only)	No operator action required.
PREPARING GASKET	Jacket temperature was below 100°C (212°F) and the gasket headring is being flushed to remove any condensate.	If necessary, gasket flush occurs automatically when START is pressed. Gasket Heat Time is an adjustable parameter. See *“Editing the Extended Parameters” on page 5–43*.
RE DOOR OPEN	Operator pressed START with the remote end door was opened.	Message will clear when door is closed.
UTILITY SHUTDOWN	The sterilizer is in Utility Shutdown mode.	Message will clear when the Utilities On alarm clock setting is activated. Utility Shutdown mode can be bypassed to run one cycle (see *“Bypassing Utility Shutdown Mode” on page 5–26*).
WAIT FOR JACKET	The jacket is heating up or cooling down.	Message will clear when the jacket reaches the temperature required to run the cycle.

TROUBLE ANALYSIS

INTRODUCTION

This section includes the following topics:

- Trouble analysis tools that are built into the control software.
- Trouble analysis charts for conditions that do not result in a diagnostic message.
- Trouble analysis charts for optional equipment.

TROUBLE ANALYSIS TOOLS

The SERVICE menu includes the ERROR LOG screen and DIAGNOSTIC menu. These features are useful in isolating malfunctions and identifying defective components.

VIEWING THE ERROR LOG

The ERROR LOG screen lists the type of error, date, time, and cycle number during which it occurred. The error contains information about the last 20 errors. When the error log is full, the oldest message is erased each time a new message is stored. The error log may be printed out for reference if desired.

To view the error log:

1. Press [SETUP].

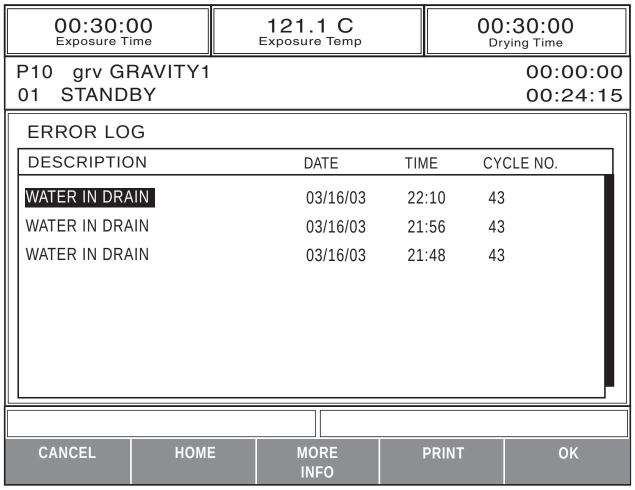
SERVICE
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE >ERROR LOG.
3. Press ENTER.

   The ERROR LOG screen appears.

4. Using the up and down arrows, select the desired error from the list.

FIGURE 8–4. ERROR LOG SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

ERROR LOG

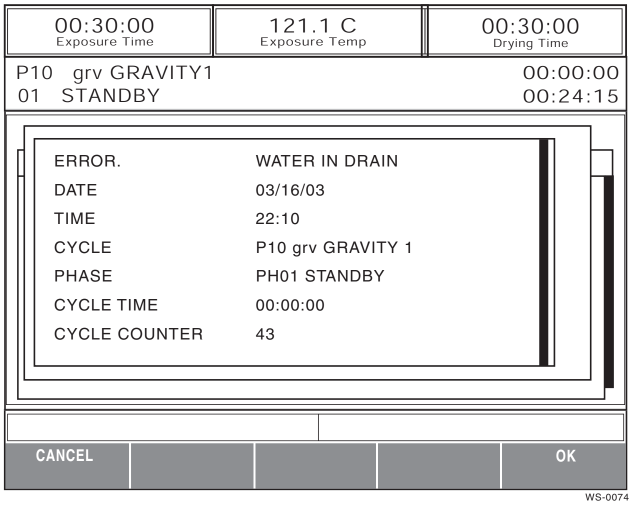
DESCRIPTION	DATE	TIME	CYCLE NO.
WATER IN DRAIN	03/16/03	22:10	43
WATER IN DRAIN	03/16/03	21:56	43
WATER IN DRAIN	03/16/03	21:48	43

WS-0073

5. Press [MORE INFO].

   Additional information is displayed.

FIGURE 8–5. ERROR LOG INFORMATION SCREEN


00:30:00
Exposure Time
121.1 C
Exposure Temp
00:30:00
Drying Time
P10 grv GRAVITY1
00:00:00
01 STANDBY
00:24:15
CANCEL
OK
WS-0074

ERROR. WATER IN DRAIN
DATE 03/16/03
TIME 22:10
CYCLE P10 grv GRAVITY 1
PHASE PH01 STANDBY
CYCLE TIME 00:00:00
CYCLE COUNTER 43

6. Press [OK].

7. Press [PRINT] to print out the list if desired.

8. Press [OK] to return to the SERVICE MENU or press [HOME] to return to the process screen.

VIEWING THE ANALOG INPUTS

The TEST ANALOG IN screen displays the temperatures measured by the temperature sensors and the pressure measured by the pressure transducer.

To view the analog inputs:

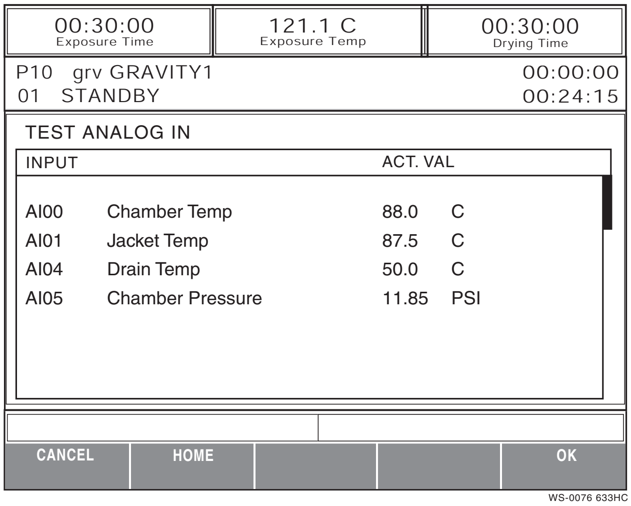
1. Press [SETUP].

SERVICE
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE> DIAGNOSTIC > ANALOG INPUT.
3. Press ENTER.

   The TEST ANALOG IN screen appears.

FIGURE 8–6. TEST ANALOG IN SCREEN



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

TEST ANALOG IN

INPUT		ACT. VAL	
AI00	Chamber Temp	88.0	C
AI01	Jacket Temp	87.5	C
AI04	Drain Temp	50.0	C
AI05	Chamber Pressure	11.85	PSI

4. When finished, press [OK] to return to the DIAGNOSTIC menu, or [HOME] to return to the process screen.

VIEWING THE DIGITAL INPUTS

The TEST DIGITAL IN screen displays the ON/OFF status of the switch inputs (0=OFF/1=ON).

To view the digital inputs:

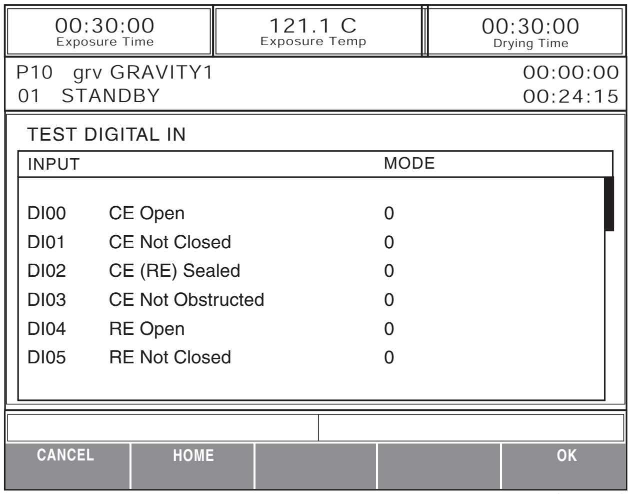
1. Press [SETUP].

SERVICE
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > DIGITAL INPUT.
3. Press ENTER.

   The TEST DIGITAL IN screen appears. The MODE field indicates whether the input is ON (1) or OFF (0).

FIGURE 8–7. TEST DIGITAL IN SCREEN



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

TEST DIGITAL IN

INPUT		MODE
DI00	CE Open	0
DI01	CE Not Closed	0
DI02	CE (RE) Sealed	0
DI03	CE Not Obstructed	0
DI04	RE Open	0
DI05	RE Not Closed	0

WS-0077 633HC

NOTE

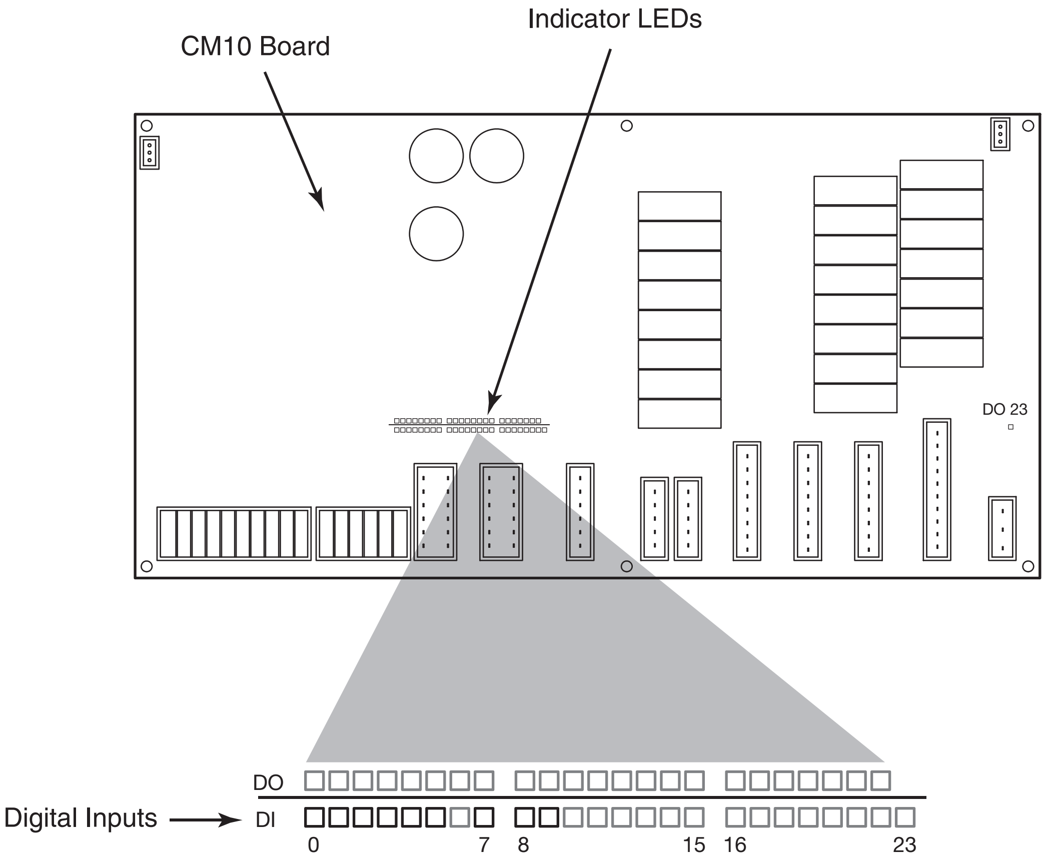
The black bar on the right indicates that there are more inputs than can be viewed on the screen at one time. Use the up and down arrows to view the inputs not shown.

---

4. When finished, press [OK] to return to the DIAGNOSTIC menu, or press [HOME] to return to the process screen.

   Refer to *Figure 8–8 on page 8–21*. The CM10 Board inside Control Box 2A also has LED indicators that show the status of the digital inputs.

FIGURE 8–8. DIGITAL INPUT LEDS


Indicator LEDs
CM10 Board
DO 23
DO
Digital Inputs
DI
0
7
8
15
16
23

Input No.	Input Device	Function
DI 00	22S	CE Open
DI 01	3S	CE Not Closed
DI 02	4S	CE (RE) Sealed
DI 03	1LE/1LR	CE Not Obstructed
DI 04	27S	RE Open
DI 05	7S	RE Not Closed
DI 06		
DI 07	2LE/2LR	RE Not Obstructed
DI 08	5S	H20 Not in Drain
DI 09	1S/6S	Controls On

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VIEWING AND OPERATING THE DIGITAL OUTPUTS

The TEST DIGITAL OUT screen displays the ON/OFF status of the output devices (0=OFF/1=ON).

Most sterilizer malfunctions will result in a specific diagnostic messages. The diagnostic message table (*Table 8–1 on page 8–5*) may recommend testing specific solenoid valves. Individual valves may be tested by operating the digital output in manual mode.

WARNING

POSSIBILITY OF INJURY: The following procedure should only be performed with the unit in standby mode and only by qualified personnel. Manual operation of the valves under any other conditions may result in dangerous conditions.

To operate the digital outputs manually:

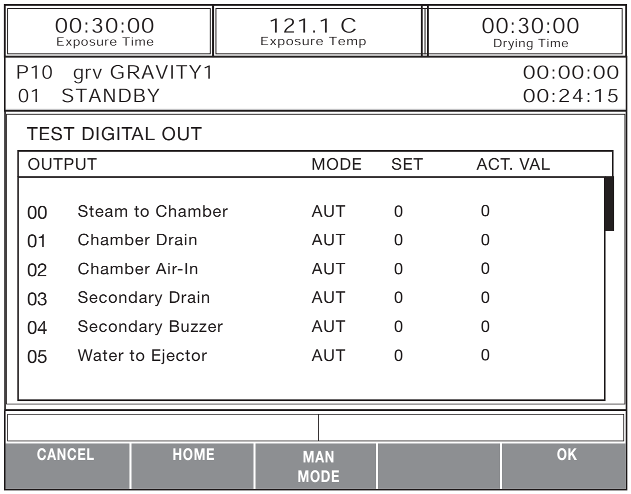
1. Press [SETUP].

SERVICE
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > DIGITAL OUTPUT.
3. Press ENTER.

   The TEST DIGITAL OUT screen appears.

FIGURE 8–9. TEST DIGITAL OUT SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

TEST DIGITAL OUT

OUTPUT		MODE	SET	ACT. VAL
00	Steam to Chamber	AUT	0	0
01	Chamber Drain	AUT	0	0
02	Chamber Air-In	AUT	0	0
03	Secondary Drain	AUT	0	0
04	Secondary Buzzer	AUT	0	0
05	Water to Ejector	AUT	0	0

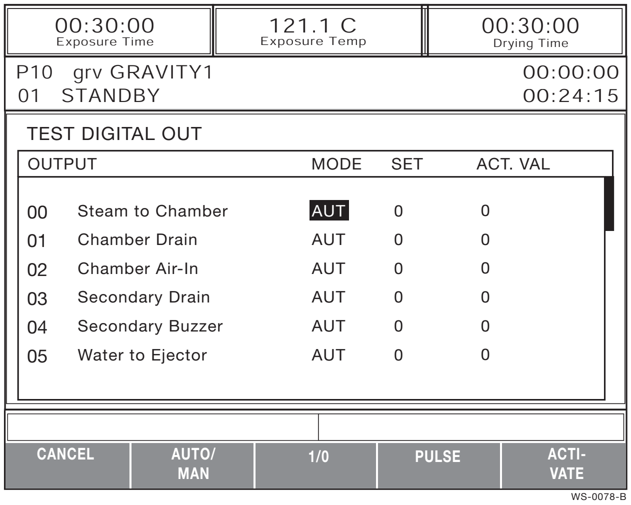
NOTE

The black bar on the right indicates that there are more inputs than can be viewed on the screen at one time. Use the up and down arrows to view inputs not shown.

4. Press [MAN MODE].

   The first item in the MODE field is highlighted.

FIGURE 8–10. TEST DIGITAL OUT SCREEN (MANUAL MODE)



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

TEST DIGITAL OUT

OUTPUT		MODE	SET	ACT. VAL
00	Steam to Chamber	AUT	0	0
01	Chamber Drain	AUT	0	0
02	Chamber Air-In	AUT	0	0
03	Secondary Drain	AUT	0	0
04	Secondary Buzzer	AUT	0	0
05	Water to Ejector	AUT	0	0

5. To operate a single manual output:
   a. Select the desired output.

      The MODE field will be highlighted.
   b. Press [AUTO/MAN] to toggle between AUTO and MANUAL mode.
   c. Press [1/0] to toggle the value in the SET field.
   d. Press [ACTIVATE] to confirm the setting.

      The CONFIG MAN MODE SET? prompt will appear.
   e. Press [YES} or [NO].

      The selected out will change state.

6. To operate several manual outputs at a time:
   a. Select the desired output.

      The MODE field will be highlighted.
   b. Press [AUTO/MAN] to toggle between AUTO and MANUAL mode.
   c. Press [1/0] to toggle the value in the SET field.
   d. Repeat steps a. thru c. for the other outputs.
   e. Press [ACTIVATE] to confirm the setting.

      The CONFIG MAN MODE SET? prompt will appear.
   f. Press [YES} or [NO].

      All outputs will change state.

7. To pulse a digital output(s):
    a. Select the desired digital output.

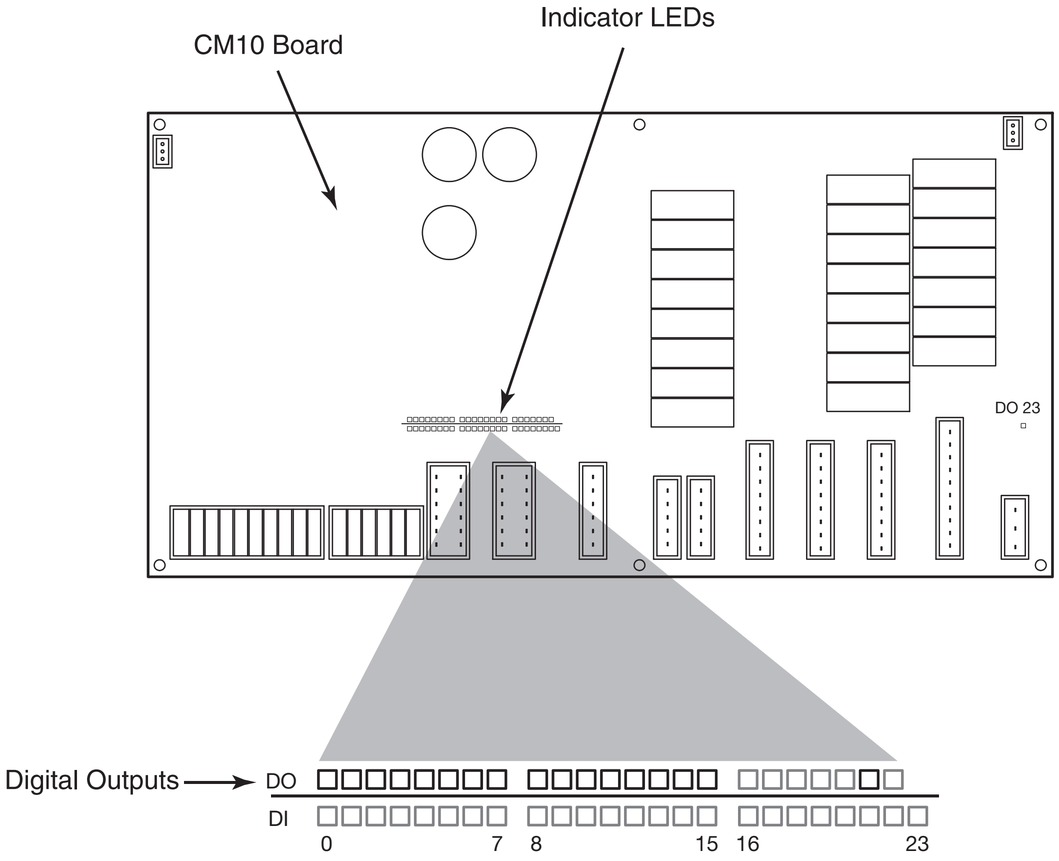
       The MODE field will be highlighted.
    b. Press [AUTO/MAN] to toggle between AUTO and MAN mode.
    c. Repeat steps a. and b. for other outputs if desired.
    d. Press [PULSE]

       The output will turn OFF for 10 seconds, turn ON for 5 seconds, then turn OFF.
8. Press [CANCEL] to exit manual mode at any time.

   All outputs will return to AUTO mode and the SERVICE menu will be displayed.
9. Press [HOME] to return to the process screen.

   Refer to *Figure 8–11 on page 8–25*. The CM10 Board inside Control Box 2A also has LED indicators that show the status of the digital inputs.

FIGURE 8–11. DIGITAL OUTPUT LEDS


Indicator LEDs
CM10 Board
DO 23
Digital Outputs
DO
DI
0
7
8
15
16
23

Output No.	Output Device	Function
DO 00	1SV	Steam to Chamber
DO 01	2SV	Chamber Drain
DO 02	3SV	Chamber Air-In
DO 03	14SV	Secondary Drain (Liq)
DO 04	1LS	Secondary Buzzer
DO 05	6SV	Water to Ejector
DO 06	17A	Boiler ON*
DO 07	8SV	Steam to Jacket
DO 08	15A2J	CE Open
DO 09	15A1J	CE Close
DO 10	10SV	CE (RE) Seal
DO 11	12SV	CE (RE) Unseal
DO 12	16AJ2	RE Open
DO 13	16AJ1	RE Close
DO 14		Water Saver ON*
DO 15	17A	Boiler Blowdown*
DO 16	5SV	Water to Drain
DO 17		
DO 18		
DO 19		
DO 20		
DO 21		
DO 22		
DO 23		

* option

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VIEWING THE SYSTEM FLAGS

The system flags indicate events that occur in the C language (operating system) portion of the control software.

To view the system flags:

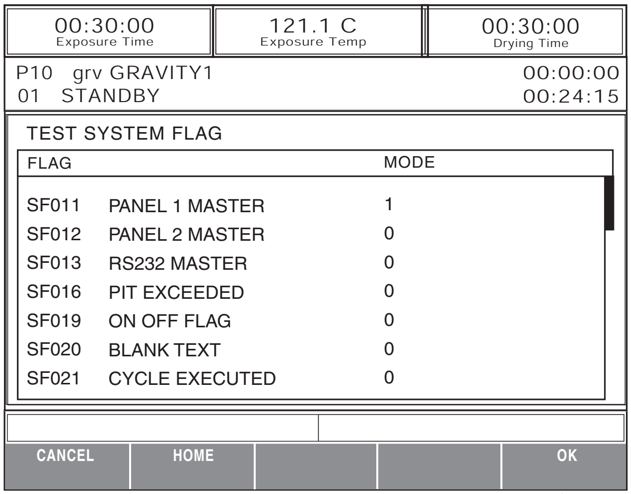
1. Press [SETUP].

SERVICE
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > SYSTEM FLAG.
3. Press ENTER.

   The TEST SYSTEM FLAG screen appears.

FIGURE 8–12. TEST SYSTEM FLAG SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

TEST SYSTEM FLAG

FLAG		MODE
SF011	PANEL 1 MASTER	1
SF012	PANEL 2 MASTER	0
SF013	RS232 MASTER	0
SF016	PIT EXCEEDED	0
SF019	ON OFF FLAG	0
SF020	BLANK TEXT	0
SF021	CYCLE EXECUTED	0

NOTE
The black bar on the right indicates that there are more flags than can be viewed on the screen at one time. Use the up and down arrows to view flags not shown.

4. The MODE field indicates whether the software flag in ON (1) or OFF (0).
5. Refer to Appendix B for system flag definitions.

NOTE
System flags do NOT provide a real-time indication of the control system status.

VIEWING THE USER FLAGS

The user flags indicate events that occur in the Boolean language (application program) portion of the control software.

To view the user flags:

1. Press [SETUP].

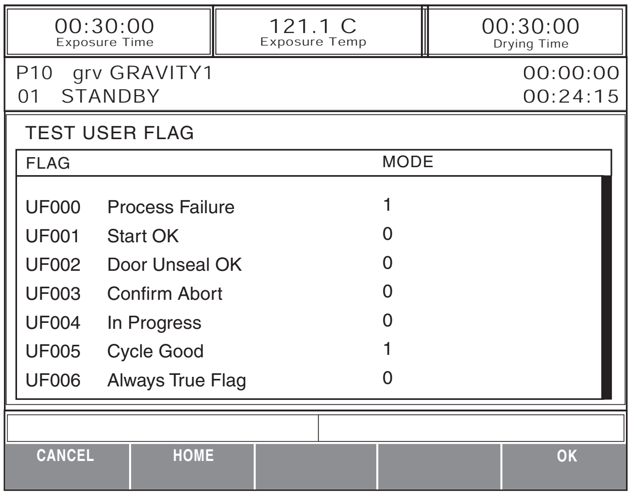
SERVICE
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > USER FLAG.

3. Press ENTER.

   The TEST USER FLAG screen appears.

FIGURE 8–13. TEST USER FLAG SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

TEST USER FLAG

FLAG		MODE
UF000	Process Failure	1
UF001	Start OK	0
UF002	Door Unseal OK	0
UF003	Confirm Abort	0
UF004	In Progress	0
UF005	Cycle Good	1
UF006	Always True Flag	0

NOTE
The black bar on the right indicates that there are more flags than can be viewed on the screen at one time. Use the up and down arrows to view flags not shown.

4. The MODE field indicates whether the software flag is ON (1) or OFF (0).

5. Refer to Appendix B for user flag definitions.

NOTE
User flags provide a real-time indication of the program status. They update immediately when an event occurs.

TESTING THE PRINTER

To test the printer:

1. Press [SETUP].

SERVICE ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > PRINTER.
3. Press ENTER.
4. Press [PRINT].

   The printer outputs a test string.

TESTING THE LEDS AND BUZZER

To test the LEDs and buzzer:

1. Press [SETUP].

SERVICE ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > LED/BUZZER.
3. Press ENTER.
4. Press [TEST].

   All control panel LEDs light and the alarm sounds for five seconds.

TROUBLE ANALYSIS TABLES

Most sterilizer malfunctions will result in a specific diagnostic message. The following tables list some additional problems that are not covered by the diagnostic message tables.

POWER SUPPLIES

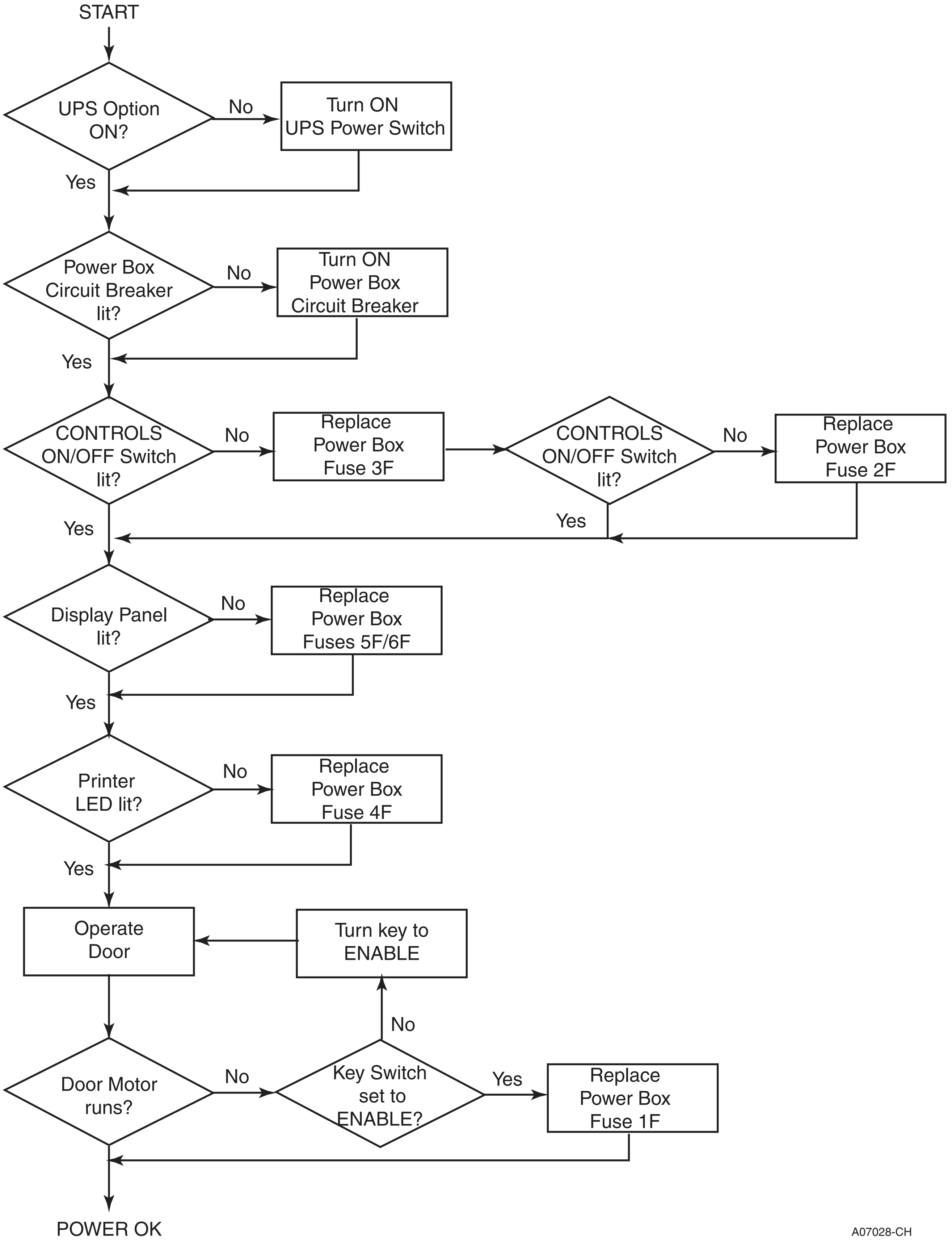
The following voltages are present in the sterilizer:

- 120 Vac—customer supply and door motors
- 24 Vac—analog and digital inputs, digital outputs, and printer
- 18 Vac—CPU board and display panels

TABLE 8–3. FUSES

Location	Fuse	Rating	Circuits Protected
Power Box 1A	1F	5A	Door motors
	2F	4A	All 18 Vac and 24 Vac circuits
	3F	8A	All 24 Vac circuits except printer
	4F	2.5A	Printer
	5F 6F	2.5A	All 18 Vac circuits
GTS-30A Steam Boiler	1F	15A	Boiler controls
	2F	15A	Boiler water pump
CAS-45A Steam Boiler	1F	10A	Boiler controls
	2F	5A	Boiler water pump
CAS-45 Steam Boiler (208V Model only)	1F 2F 3F 4F 5F 6F	100A	Boiler heaters

FIGURE 8–14. POWER SUPPLY TROUBLE ANALYSIS FLOWCHART


START
UPS Option ON?
No
Turn ON UPS Power Switch
Yes
Power Box Circuit Breaker lit?
No
Turn ON Power Box Circuit Breaker
Yes
CONTROLS ON/OFF Switch lit?
No
Replace Power Box Fuse 3F
CONTROLS ON/OFF Switch lit?
No
Replace Power Box Fuse 2F
Yes
Yes
Display Panel lit?
No
Replace Power Box Fuses 5F/6F
Yes
Printer LED lit?
No
Replace Power Box Fuse 4F
Yes
Operate Door
Turn key to ENABLE
No
Door Motor runs?
No
Key Switch set to ENABLE?
Yes
Replace Power Box Fuse 1F
POWER OK
A07028-CH

CONTROL SYSTEM

Table 8–4lists some possible causes of control system malfunction and suggests corrective actions.

TABLE 8–4. CONTROL SYSTEM TROUBLE ANALYSIS

PROBLEM	POSSIBLE CAUSES	REMEDY
Random or erratic action of signals on the control panel.	Power line malfunction.	Turn power OFF, wait one minute, turn power ON.
	Wire connections between Control Box 2A and Display Panel.	Check that connectors are secure.
	Display Panel malfunction.	Replace Display Panel.
	CPU Board malfunction.	Replace CPU Board 2A1U.

To test the control panel, select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > TEST LEDS/BUZZER.

NOTE

The alarm buzzer is mounted on the back side of I/O I/F Board 2A3U.

PRINTER

The printer has a status indicator that flashes when the printer requires attention.

FIGURE 8–15. STATUS INDICATOR

● OFF = NO POWER

○ ON = READY

☼ BLINKING = PRINTER NOT READY, PAPER NOT PROPERLY INSERTED, OR ROLL COVER OPEN

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Table 8–5 lists possible causes of printer malfunctions and suggests corrective actions. To test the printer, select SYSTEM MENU > enter password > SERVICE > DIAGNOSTIC > PRINTER.

TABLE 8–5. PRINTER TROUBLE ANALYSIS

PROBLEM	POSSIBLE CAUSE	REMEDY
Control Panel is ON but printer status indicator is OFF.	No power to printer.	Check fuse 4F in Power Box 1A.
Status Indicator is blinking.	Paper jam	Open the clear cover and paper roll cover and check for paper jam. Reinsert the paper roll and close the paper roll cover.
	Paper roll cover not closed.	Close the paper roll cover.
LOW POWER BROWN OUT message printed out.	Message may occur when power is applied to the sterilizer.	No action required.

DOOR CLOSURE

Table 8–6 lists some possible causes of door malfunctions and suggests corrective actions.

TABLE 8–6. DOOR MECHANICAL TROUBLE ANALYSIS

PROBLEM	POSSIBLE CAUSE	REMEDY
Gasket not sealing properly.	Large gap between door plate and gasket ring.	Adjust door gap. See *“Aligning the Door” on page 9–38*.

TROUBLE ANALYSIS — OPTIONAL EQUIPMENT

STEAM BOILER

Table 8–7list possible causes of boiler malfunctions and suggests corrective actions.

TABLE 8–7. STEAM BOILER TROUBLE ANALYSIS

PROBLEM	POSSIBLE CAUSE	REMEDY
Heating too slowly.	One phase of three-phase circuit is missing.	Check input, contactor, and heater.
	Accumulation of scale on heaters.	Blow down boiler or remove heater and clean.
	Probe not functioning.	Clean or replace probe.
	Defective probe insulator.	Clean or replace insulator.
Water does not shut off (flooded boiler).	Defective solenoid valve.	Clean or replace valve.
	Defective solid-state liquid level control.	Replace solid-state liquid level control.
	Wire to probe loose or defective.	Tighten or replace wire.
	Probe not functioning.	Clean or replace probe.
	Defective probe insulator.	Clean or replace insulator.
Boiler unable to maintain pressure under load	Probe broken off.	Replace probe.
	One phase of three-phase circuit is missing.	Correct condition.
	Accumulation of scale on heater, or defective heater.	Clean or replace heater.
	Defective probe insulator.	Clean or replace insulator
Feedwater pump and water solenoid operate intermittently.	Defective solid-state liquid level control.	Replace solid-state liquid level control.
	Defective probe insulator.	Clean or replace insulator.
Heater operates intermittently.	Defective solid-state liquid level control.	Replace solid-state liquid level control.
	Defective pressure control.	Replace pressure control.
	Defective contactor.	Replace contactor.
Safety valve blows steam.	Defective pressure control.	Replace pressure control.
	Defective contactor.	Replace contactor.

TABLE 8–7. STEAM BOILER TROUBLE ANALYSIS

PROBLEM	POSSIBLE CAUSE	REMEDY
Feedwater pump does not operate.	Water supply closed.	Turn on water supply.
	Water filter plugged.	Clean filter.
	Defective probe.	Replace probe.
	Defective solid-state liquid level control.	Replace solid-state liquid level control.
	HI-LIMIT control tripped.	Reset and confirm HI-LIMIT control is functioning.
	Defective solenoid valve.	Clean or replace solenoid valve.
	Defective wiring.	Check wiring/replace pump.

CHECKING THE WATER LEVEL

A sight glass on the side of the boiler indicates the water level in the boiler.

To check the boiler water level

1. Inspect the sight glass located on the side of the boiler:
   - The normal water level is at the center of the sight glass.
   - A low water condition is indicated by low or no water in the sight glass.
   - If the boiler is flooded, the sight glass will be full.

CHECKING THE WATER SOLENOID VALVE

To check the water solenoid:

1. Loosen the union connection below the solenoid valve.
2. Observe that water is present when the solenoid valve is energized.

CHECKING THE HEATER CIRCUIT

The heating elements are wired in a delta configuration. Unequal current through each phase indicates a defective heating element.

To check the heater circuit:

1. See *“Checking the Boiler Heater Current” on page 4–35*.

WATER-SAVER

Table 8–8 lists possible water-saver malfunctions and suggests corrective actions.

TABLE 8–8. WATER-SAVER TROUBLE ANALYSIS

PROBLEM	POSSIBLE CAUSE	REMEDY
Little or no vacuum (pump running).	Chamber drain screen clogged.	Clean drain screen.
	Solenoid valve 15SV not opening.	Clean or repair.
	Solenoid valve 2SV (chamber drain) not opening properly.	Clean or repair.
	Clogged ejector or vacuum line.	Clean or replace.
	Water supply off or restricted.	Restore water supply.
	Temperature switch.	Readjust or replace.
	Check valve in flexible vacuum line.	Clean or replace.
	Pump defective.	Repair or replace.
	Piping leaks.	Repair or replace.
Motor does not run.	Electrical supply off.	Restore electrical supply.
	Motor defective.	Repair or replace.
	Pump seizes.	Repair or replace.
Water overflows continuously from reservoir.	Water solenoid open	Repair or replace.
	Temperature switch activated.	Repair or readjust
Overflow water too hot (steam)	Temperature control defective	Adjust temperature control valve.

BOOSTER PUMP

Table 8–9 lists possible booster pump malfunctions and suggests corrective actions.

TABLE 8–9. BOOSTER PUMP TROUBLE ANALYSIS

PROBLEM	POSSIBLE CAUSE	REMEDY
Booster pump won’t start or run.	Blown fuse.	If blown, replace with fuse of proper size.
	Low line voltage.	If voltage under recommended minimum, check size of wiring from main switch on property. If OK, contact power company.
	Loose, broken, or incorrect wiring.	Rewire any incorrect circuits. Tighten connections, replace defective wires. Check motor connections.
	Defective motor.	Replace motor.
Booster pump operates, but delivers liquid or no water.	Low line voltage.	If voltage under recommended minimum, check size of wiring from main switch on property. If OK, contact power company.
	System incompletely primed.	Reprime if necessary.
	Air lock in suction line.	Rearrange piping to eliminate air lock.
	Undersized piping.	Replace undersized piping.
	Leak on suction side of system.	Make sure above ground connections are tight, then repeat test. If necessary pull piping and repair leak.
	Defective or plugged foot valve and/or strainer.	Clean, repair, or replace as needed.
	Worn or defective pump parts or plugged impeller.	Replace worn parts or entire pump. Clean parts if required.

SECTION 9 CALIBRATION AND ADJUSTMENTS

CALIBRATION

OVERVIEW

There are two methods of calibration available through the service menu: automatic and manual.

The procedures in this section use the automatic method, in which low and high reference values for each sensor are stored in memory.

When the manual method is used (see *“Entering the Calibration Data Manually” on page 5–28*), the gain and offset values for each sensor are entered directly.

PRESSURE TRANSDUCER CALIBRATION

☞ ***NOTE***
The pressure transducer used with the PACS 3500 system is different from the one with used with the PACS 3000 system. It does not require a matched resistor set or list of bridge compensation values. If the pressure transducer does not pass the calibration check, the drift may be caused by either the pressure transducer or the analog input circuit on the CM10 board.

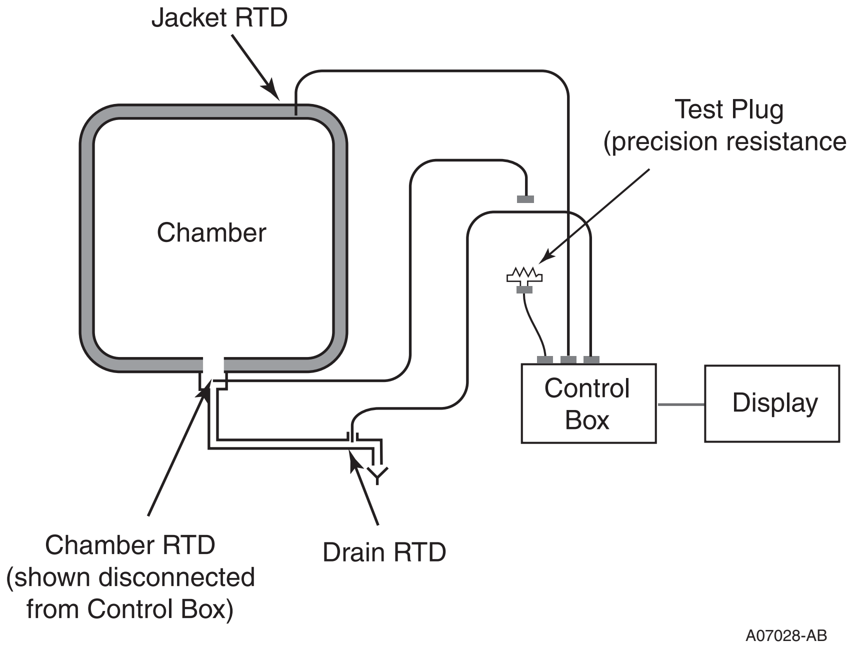
Pressure transducers are calibrated by the supplier to provide a 4 to 20 mA output signal corresponding to the operating pressure range of 0 to 60 PSIA. When a pressure transducer is installed, a gain of 1.000 and offset of 0.000 are entered using the MANUAL CALIBRATION screen.

The determination of gain and offset values to compensate for drift are beyond the scope of this manual. If the pressure values displayed by the control system during calibration check are not within specification, replace the pressure transducer.

TEMPERATURE SENSOR CALIBRATION (USING TEST PLUGS)

Refer to Figure 9–1. The temperature sensor circuit is calibrated by disconnecting the sensors from the control board and using test plugs with precision resistors for the low and high reference values. The reference values are entered using the display panel and the controls automatically calibrate the temperature input.

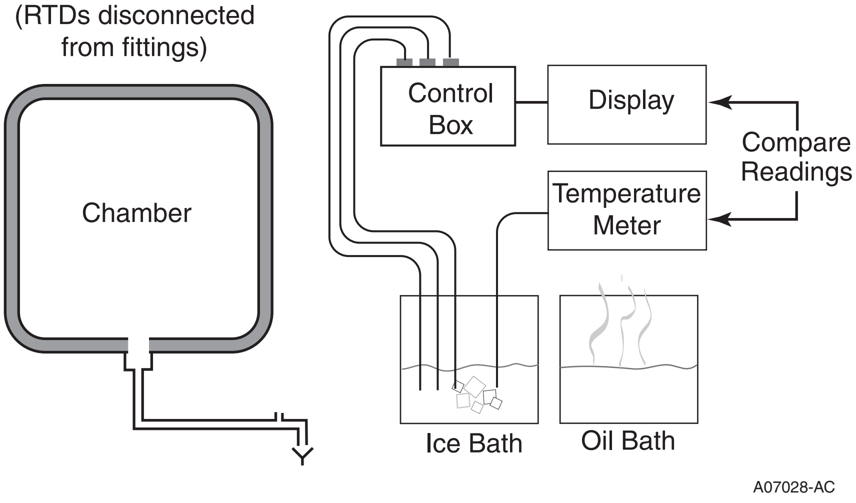
FIGURE 9–1. TEMPERATURE CALIBRATION (TEST PLUGS)


Jacket RTD
Test Plug
(precision resistance)
Chamber
Control
Box
Display
Chamber RTD
(shown disconnected
from Control Box)
Drain RTD
A07028-AB

TEMPERATURE SENSOR CALIBRATION (USING ICE AND OIL BATHS)

Refer to Figure 9–2. The temperature sensor circuit can also be calibrated by placing the RTDs in ice and oil baths and comparing the temperature displayed on the display panel with temperature displayed on the meter. The actual low and high reference values are entered using the display panel and the controls automatically calibrate the temperature inputs.

FIGURE 9–2. TEMPERATURE CALIBRATION (ICE AND OIL BATHS)


(RTDs disconnected
from fittings)
Chamber
Control
Box
Display
Compare
Readings
Temperature
Meter
Ice Bath
Oil Bath
A07028-AC

CHECKING THE CALIBRATION

Before calibrating the temperature and pressure inputs, perform the following procedure. If the temperature and pressure reading are within the specified range, calibration is not necessary.

TOOLS

- pressure Meter, 0–50 psia, accurate to ±0.05 psia.
  (must be an absolute pressure meter)—see Appendix C.

PREPARING FOR CALIBRATION CHECK

Before beginning the check:

1. Verify the following:
    - The DETAILS process screen is selected.
    - The pressure units are set to PSIA (see *“Selecting the Pressure and Temperature Units” on page 5–40*).
    - Jacket steam trap 1ST is functioning.
    - Chamber bleed valve 1X and jacket bleed valve 2X are closed.
    - The steam pressure and water pressure are within the specifications on the roughing-in drawing.
    - The sterilizer is in proper working order, i.e., all scheduled preventive maintenance has been performed.

VERIFYING THE TEMPERATURE AND PRESSURE READINGS

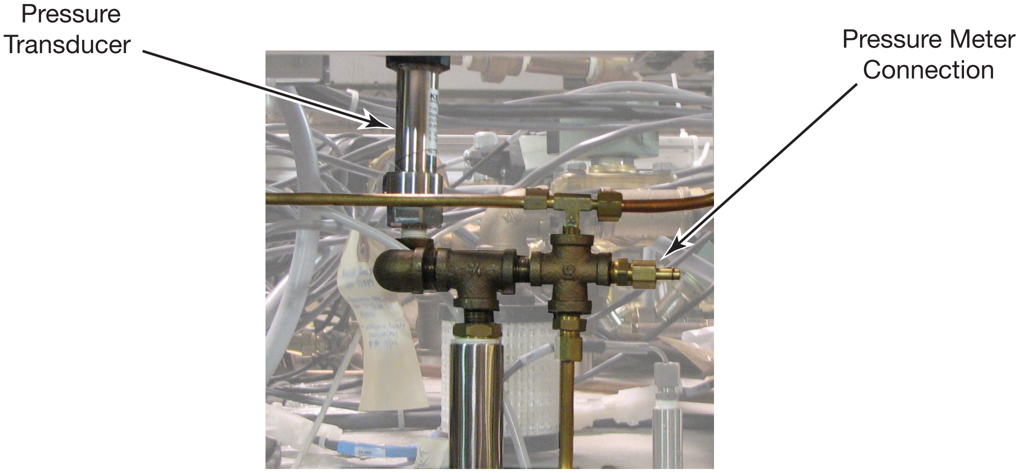
To verify the pressure and temperature readings:

1. Connect the pressure meter.

☞ ***NOTE***

Be sure the pressure meter is at the same level or higher than the pressure meter connection on the unit, so that water does not build up in the tubing to the pressure meter. Also be sure the tubing does not form a loop below the pressure meter. If standing water collects in the tubing, extra static pressure from the water column can result in faulty meter readings.

FIGURE 9–3. PRESSURE METER CONNECTION



RIGHT SIDE OF VESSEL

A07028-CL

2. Turn ON the sterilizer.
3. Check the atmospheric pressure.
    a. Open the sterilizer door.
    b. With the sterilizer in standby mode, note the chamber pressure as displayed on the DETAILS process screen.
    c. Verify the pressure displayed is within ±0.2 psi of the pressure meter reading.
    d. Select a prevacuum cycle with the following cycle parameters:
        - Exposure Temperature—275°F
        - Exposure Time—10:00 minutes
        - Drying Time—10:00 minutes
4. Check the high pressure.
    a. Start the cycle.

b. After the sterilizer has been in the exposure phase for approximately three minutes, note the chamber pressure displayed on the process screen.

c. Verify the pressure displayed is within ±0.2 psi of the pressure meter reading.

d. If the pressure displayed is NOT within ±0.2 psi of the pressure meter reading, check the following:

- Pressure transducer 1PT wiring and connectors are tight.
- Jacket steam trap 1ST is functioning.
- Chamber bleed valve 1X and jacket bleed valve 2X are closed.
- The steam pressure and water pressure are within the specification on the roughing-in drawing.
- The unit passes a vacuum leak test.
- The solenoid valves are operating correctly and check valves are not clogged.

e. If the check in step d does not correct the problem, replace the pressure transducer. Then repeat steps 3 thru 5. Do not proceed to step 6 until a satisfactory reading is displayed.

NOTE
If the unit does not pass the pressure check after the pressure transducer is replaced, the analog input circuit is the cause of the drift. Replace the CM10 board.

5. Check the CHAMBER gauge(s).

a. Verify that the CHAMBER pressure gauge reads within ±2.0 psi of the pressure meter reading.

NOTE
The CHAMBER pressure gauge indicates pressure in PSIG; the pressure meter measures pressure in PSIA. Before comparing the two readings, add the atmospheric pressure to the CHAMBER gauge reading.

b. If the unit is double door, check both CHAMBER pressure gauges.

6. Check the temperature.

a. While the unit is still in the EXPOSURE phase, observe the STEAM DIFF (steam table difference) value on the DETAILS process screen.

b. Verify the number displayed, when at its lowest value, is between –0.6 and +0.6.

c. If the number displayed is NOT within the limits, check the following:

  - The temperature sensors are inserted to the proper depths (see *“Replacing a Temperature Sensor” on page 10–1*).
  - The sensor cable wiring and connectors are intact.

d. If the check in step c does not correct the problem, calibrate the temperature sensors. Then repeat steps 3 thru 7. Do not proceed to step 8 until a satisfactory reading is displayed.

7. Check the pressure during the VACUUM DRY phase as follows:

  a. After the sterilizer has been in the VACUUM DRY phase for approximately 3 minutes, note the chamber pressure displayed on the process screen.

  b. Verify the pressure displayed is within ±0.2 psi of the pressure meter reading.

  c. If the pressure displayed is NOT within ±0.2 psi of the pressure meter reading, check the following:

    - Pressure transducer 1PT wiring and connectors are tight.
    - Jacket steam trap 1ST is functioning.
    - Chamber and jacket bleed valves are closed.

  d. If the check in step c does not correct the problem, replace the pressure transducer. Then repeat steps 3 thru 8. Do not proceed to step 9 until a satisfactory reading is displayed.

NOTE
If the unit does not pass the pressure check after the pressure transducer is replaced, the analog input circuit is the cause of the drift. Replace the CM10 board.

8. Allow the cycle to complete.

9. Print out the report of the cycle. Be sure the printout indicates the cycle completed without errors.

CALIBRATING THE TEMPERATURE SENSORS (USING TEST PLUGS)

TOOLS AND MATERIALS

- test plugs (temperature)—see Appendix C
  - Low—15°C (59°F)
  - High—143°C (289.4°F)
- adapter plug—see Appendix C
- grounding strap

ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES
ESD

CAUTION

Wear a grounding strap at all times when inside the control box. Otherwise, damage to the electronic components can result.

During calibration of any circuit, an appropriate input must be inserted on all temperature and pressure circuits. The absence of an input on any circuit may result in an improper calibration.

When calibrating temperature and pressure signals, all sensor inputs must be within range. Before turning on power, ensure that all sensors are connected or that a calibration test plug is attached.

SETTING UP FOR CALIBRATION

Before performing the calibration procedure:

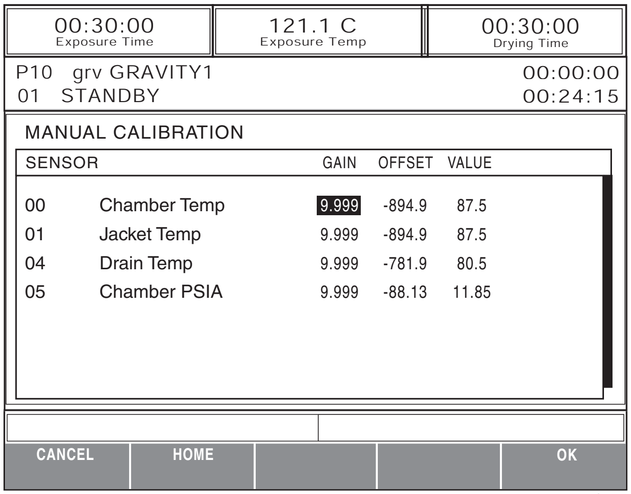
CALIBRATION

ACCESS REQUIRED

1. Select SYSTEM MENU > enter password > CALIBRATION > MANUAL.
2. Press ENTER.

   The MANUAL CALIBRATION screen appears.

FIGURE 9–4. MANUAL CALIBRATION SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

MANUAL CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
00	Chamber Temp	9.999	-894.9	87.5
01	Jacket Temp	9.999	-894.9	87.5
04	Drain Temp	9.999	-781.9	80.5
05	Chamber PSIA	9.999	-88.13	11.85

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3. Verify the sensor to be calibrated is set to GAIN = 1.000 and OFFSET = 0.000,

4. Adjust the GAIN and OFFSET as necessary.

5. Turn OFF the steam supply.

NOTE

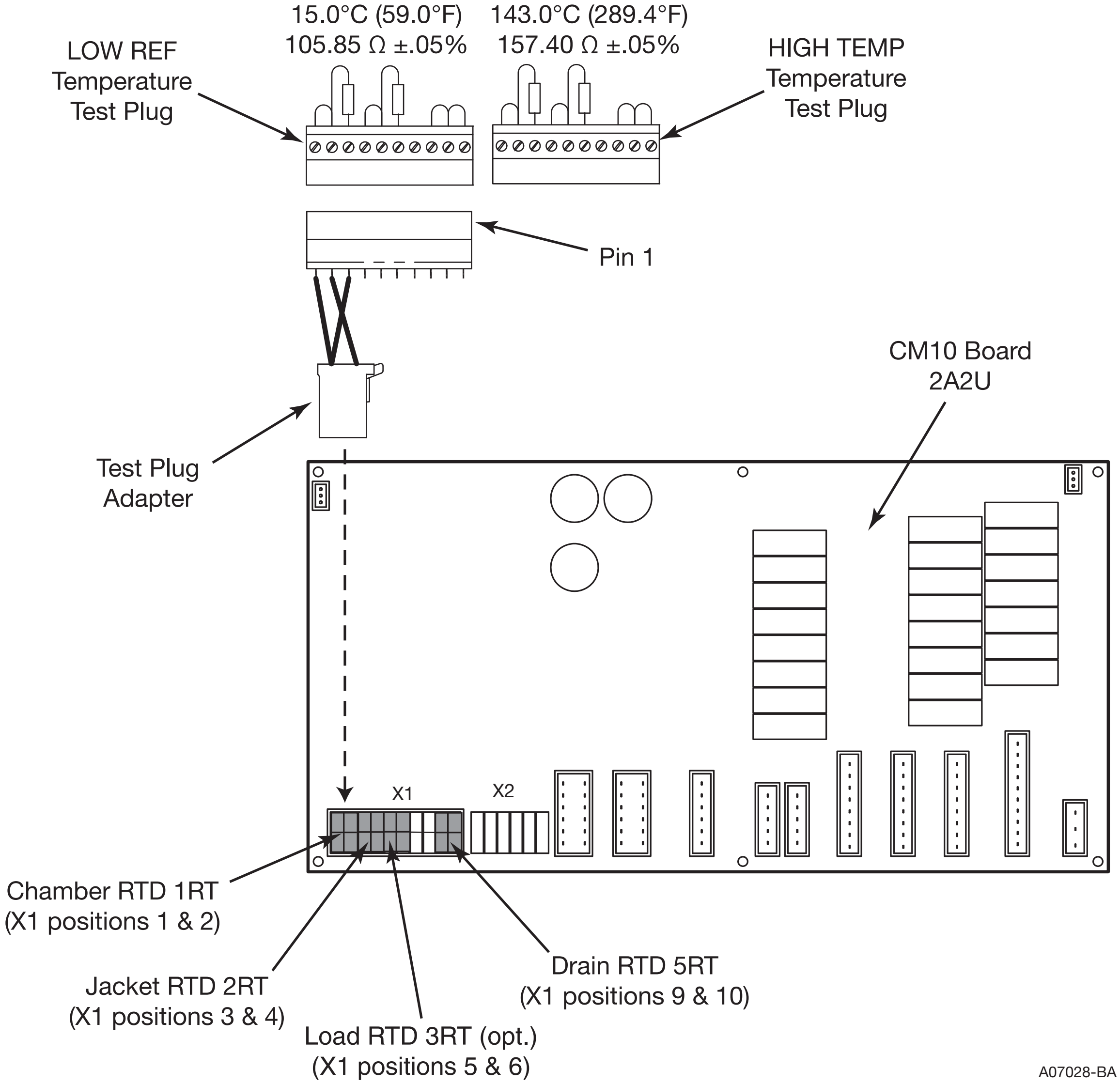
The steam supply can be turned off by using Manual Mode to turn off the Steam to Chamber and Steam to Jacket outputs.

---

6. Turn OFF the circuit breaker on Power Box 1A.

7. Disconnect the sensor to be calibrated from the CM10 board 2U. See Figure 9–5.

FIGURE 9–5. LOCATION OF TEST PLUGS ON CM10 BOARD (2U)


15.0°C (59.0°F)
105.85 Ω ±.05%
143.0°C (289.4°F)
157.40 Ω ±.05%
LOW REF Temperature Test Plug
HIGH TEMP Temperature Test Plug
Pin 1
CM10 Board 2A2U
Test Plug Adapter
X1
X2
Chamber RTD 1RT (X1 positions 1 & 2)
Jacket RTD 2RT (X1 positions 3 & 4)
Load RTD 3RT (opt.) (X1 positions 5 & 6)
Drain RTD 5RT (X1 positions 9 & 10)

A07028-BA

8. Replace the sensor with the adapter plug.

9. Insert the LOW Test Plug (15°C [59°F]) into the adapter plug.

10. Turn ON the circuit breaker on Power Box 1A.

CALIBRATING THE RTDS

☞ ***NOTE***

Temperature readings must agree to within ±0.5°F (±0.3°C).

Each calibration may be done either as an independent procedure or as part of a series.

To calibrate a temperature sensor using test plugs:

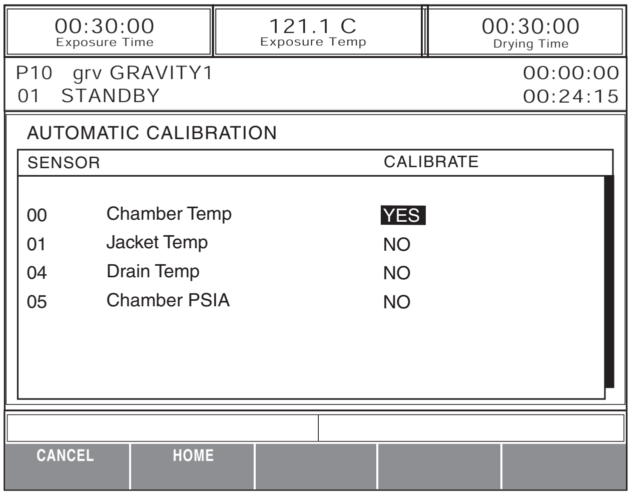
1. Calibrate the LOW REF value:
   a. Press [SETUP].
   b. Select SYSTEM MENU > enter password > CALIBRATION > AUTOMATIC.
   c. Press ENTER.

      The AUTOMATIC CALIBRATION screen appears.
   d. Set the CALIBRATE field for the input to be calibrated to YES.

CALIBRATION

ACCESS REQUIRED

FIGURE 9–6. AUTOMATIC CALIBRATION SCREEN



00:30:00 Exposure Time

121.1 C Exposure Temp

00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00

01 STANDBY 00:24:15

AUTOMATIC CALIBRATION

SENSOR		CALIBRATE
00	Chamber Temp	YES
01	Jacket Temp	NO
04	Drain Temp	NO
05	Chamber PSIA	NO

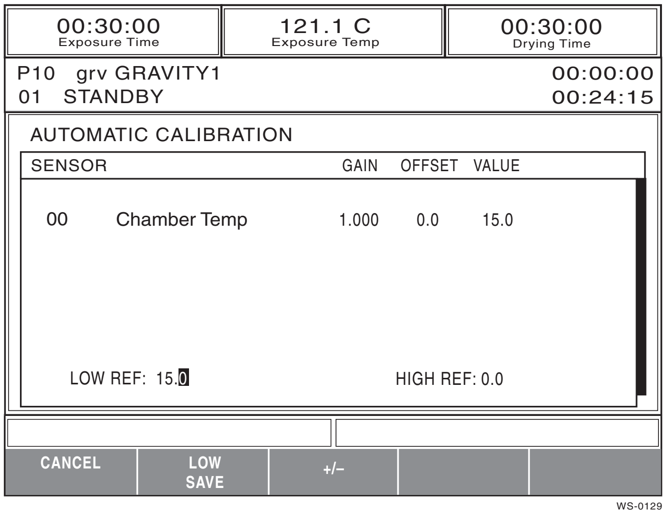
WS-0128 633HC

   e. Press ENTER.

      The [NEXT] softkey appears.
   f. Press [NEXT]

      The LOW REF: field is highlighted.

FIGURE 9–7. ENTER LOW REFERENCE



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

AUTOMATIC CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
00	Chamber Temp	1.000	0.0	15.0

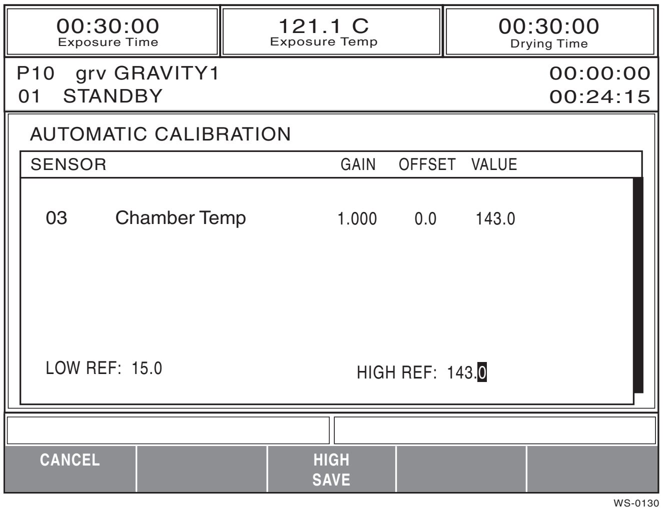
LOW REF: 15.0
HIGH REF: 0.0

g. Set LOW REF: to 15.0°C (59.0°F).

h. Press [LOW SAVE].

The HIGH REF: field is highlighted.

FIGURE 9–8. ENTER HIGH REFERENCE



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

AUTOMATIC CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
03	Chamber Temp	1.000	0.0	143.0

LOW REF: 15.0
HIGH REF: 143.0

2. Calibrate the HIGH REF value:

   a. Replace the LOW Test Plug with the HIGH Test Plug (143°C [289.4°F]).

   b. Set HIGH REF: to 143.0°C (289.4°F).

   c. Press [HIGH SAVE].

   The *PRINT CALIBRATION PROTOCOL?* prompt appears.

   d. Press [YES].

      - The printer will print the new values for GAIN, OFFSET, LOW REF, and HIGH REF.

        - Tear off and save the printouts as the calibration record.

3. Press [CANCEL].
4. Repeat *“Setting Up for Calibration” on page 9–7* and *“Calibrating the RTDs” on page 9–9* for the other temperature sensors.

SERVICE
ACCESS REQUIRED

5. Select SYSTEM MENU > enter password > SAVE RAM TO FLASH.
6. Press ENTER.

   The SAVE RAM TO FLASH screen appears.

7. Press [YES].
    - The loading process takes approximately 10 to 15 seconds.
    - During the loading process, a “Saving RAM to FLASH” progress message appears.
8. Turn OFF the circuit breaker on Power Box 1A.
9. Reconnect the sensors to the CM10 Board 2U.
10. Verify the calibration:
    a. Refer to *“Checking the Calibration” on page 9–3*.
    b. If the unit fails the general check:
        - Repeat the calibration.
        - Replace the temperature sensors.
        - Replace CM10 board 2U.
11. RTD calibration is complete.

CALIBRATING THE TEMPERATURE SENSORS (USING ICE AND OIL BATHS)

TOOLS AND MATERIALS

- ice and oil baths (temperature reference)
- digital thermometer

SETTING UP FOR CALIBRATION

Before performing the calibration procedure:

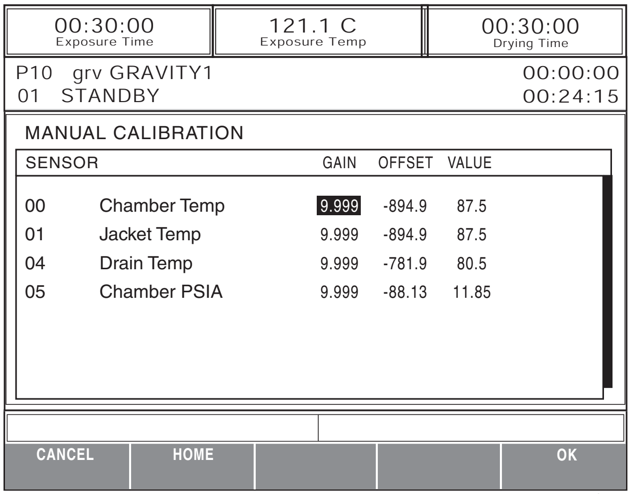
1. Press [SETUP].
2. Select SYSTEM MENU > enter password > CALIBRATION > MANUAL.

CALIBRATION
ACCESS REQUIRED

3. Press ENTER.

   The MANUAL CALIBRATION screen appears.

FIGURE 9–9. MANUAL CALIBRATION SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

MANUAL CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
00	Chamber Temp	9.999	-894.9	87.5
01	Jacket Temp	9.999	-894.9	87.5
04	Drain Temp	9.999	-781.9	80.5
05	Chamber PSIA	9.999	-88.13	11.85

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4. Verify the sensors to be calibrated are set to GAIN = 1.000 and OFFSET = 0.000.
5. Adjust the GAIN and OFFSET as necessary.
6. Turn OFF the circuit breaker on Power Box 1A.
7. Remove the RTDs to be calibrated from their fittings.
8. Place the RTDs in an ice bath or equivalent.
9. Place the thermometer probe in the ice bath.
10. Turn ON the circuit breaker on Power Box 1A.

CALIBRATING THE RTDS

NOTE

Temperature readings must agree to within ±0.5°F (±0.3°C).

Each calibration may be done either as an independent procedure or as part of a series.

To calibrate the RTDs using ice and oil baths:

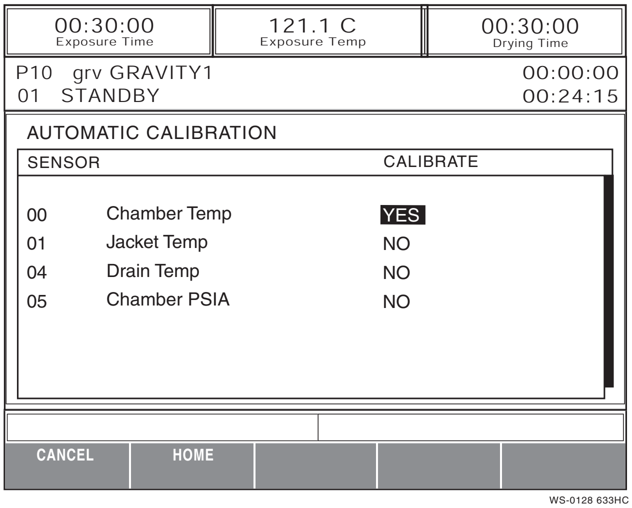
1. Press [SETUP].

CALIBRATION
ACCESS REQUIRED

2. Select SYSTEM MENU > enter password > CALIBRATION > AUTOMATIC.
3. Press ENTER.

   The AUTOMATIC CALIBRATION screen appears.

FIGURE 9–10. AUTOMATIC CALIBRATION SCREEN



00:30:00 Exposure Time
121.1 C Exposure Temp
00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

AUTOMATIC CALIBRATION

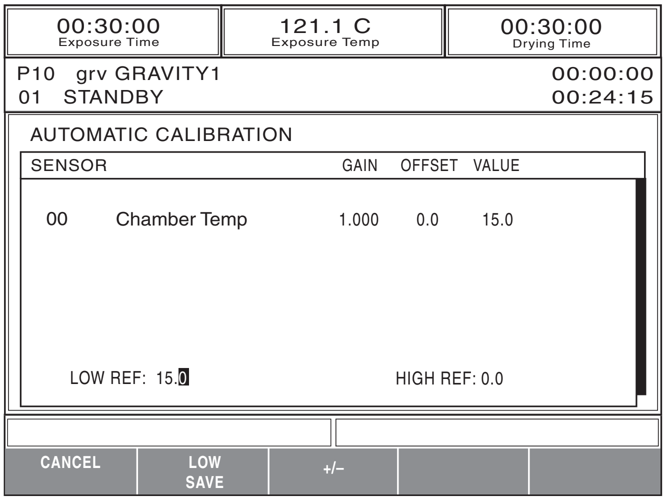
SENSOR		CALIBRATE
00	Chamber Temp	YES
01	Jacket Temp	NO
04	Drain Temp	NO
05	Chamber PSIA	NO

4. Calibrate the LOW REF value:
   a. Set the CALIBRATE field for the selected input to YES.
   b. Press ENTER.

      The [NEXT] softkey appears.
   c. Press [NEXT].

      The LOW REF: field is highlighted.

FIGURE 9–11. ENTER LOW REFERENCE



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

AUTOMATIC CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
00	Chamber Temp	1.000	0.0	15.0

LOW REF: 15.0 HIGH REF: 0.0

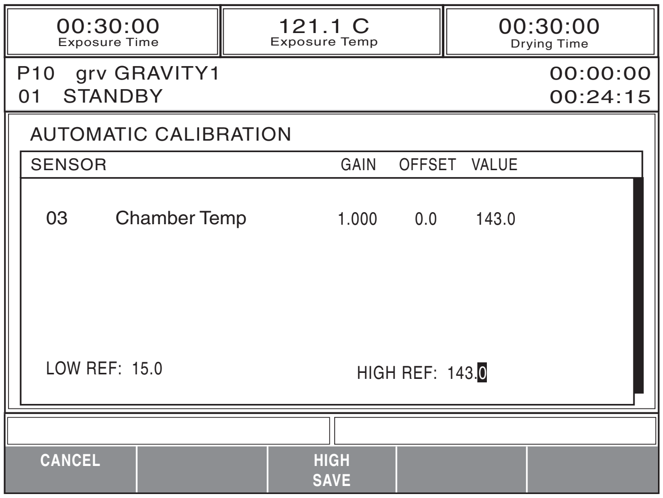
d. Wait for both readings — the reading in the display window and the temperature meter — to stabilize.

e. Enter the temperature reading in the LOW REF: field.

f. Press [LOW SAVE].

The HIGH REF: field is highlighted.

FIGURE 9–12. ENTER HIGH REFERENCE



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

AUTOMATIC CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
03	Chamber Temp	1.000	0.0	143.0

LOW REF: 15.0 HIGH REF: 143.0

5. Calibrate the HIGH REF value:

   a. Place the sensors in the oil bath or equivalent. Heat the oil bath to approximately 135°C (275°F).

NOTE

Temperature should be within 121.1°C (250°F) to 135°C (275°F) range.

---

   b. Place the temperature meter probe in the oil bath.

   c. Wait for both readings — the reading in the display window and the temperature meter — to stabilize.

   d. Enter the temperature reading in the HIGH REF: field.

   e. Press [HIGH SAVE].

      The *PRINT CALIBRATION PROTOCOL?* prompt appears.

   f. Press [YES].

      The printer will print the new values for A, B, LOW REF, and HIGH REF.

6. Press [CANCEL].

7. Tear off and save the printouts as the calibration record.

8. Repeat steps 3 thru 6 for the other RTDs.

SERVICE
ACCESS REQUIRED

9. Select SYSTEM MENU > enter password > SAVE RAM TO FLASH.

10. Press ENTER.

    The SAVE RAM TO FLASH screen appears.

11. Press [YES].
    - The loading process takes approximately 10 to 15 seconds.
    - During the loading process, a “Saving RAM to FLASH” progress message appears.

12. Remove the RTDs from the oil bath and reinstall the RTDs into their fittings.

13. Verify the calibration:

    a. Refer to *“Checking the Calibration” on page 9–3*.

    b. If the unit fails the general check:
       - Repeat the calibration.
       - Replace the temperature sensors.
       - Replace CM10 board 2U.

14. RTD calibration is complete.

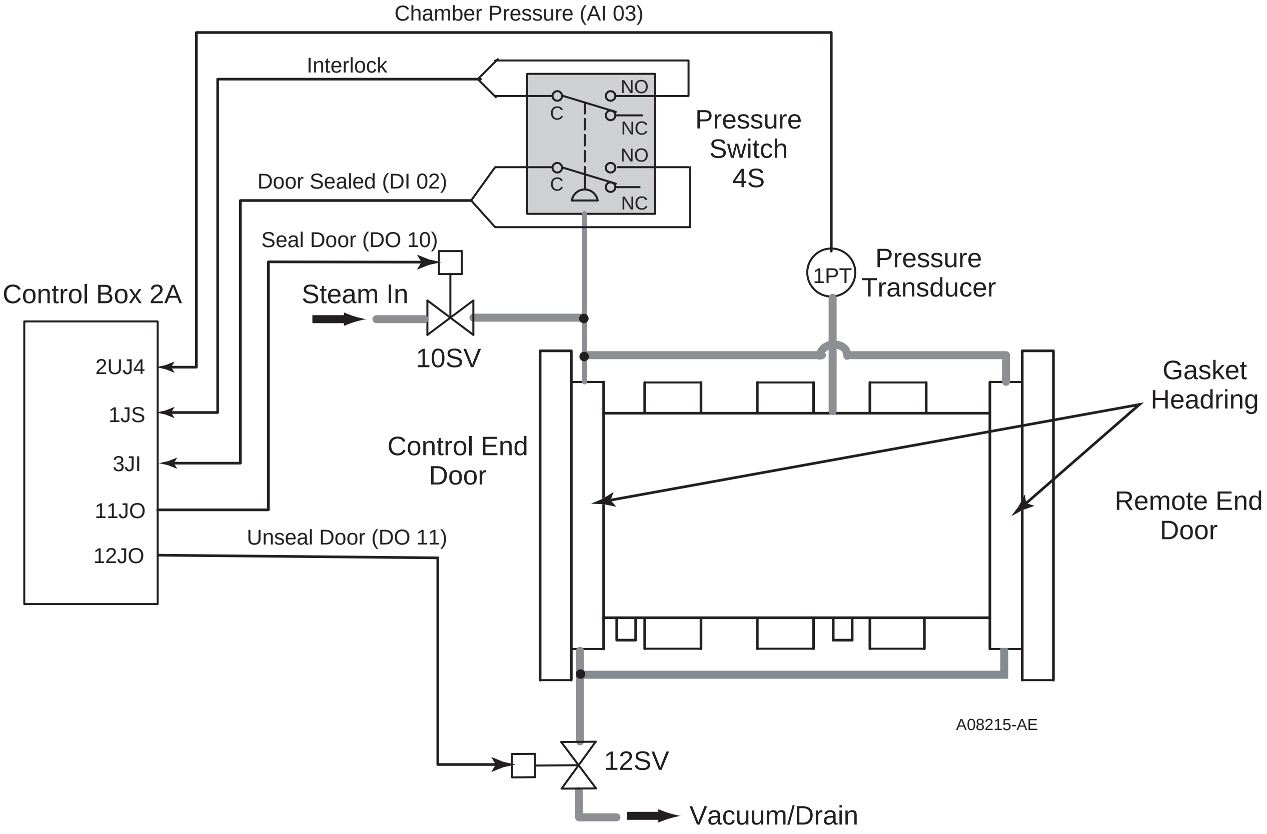
CONTROL SYSTEM ADJUSTMENTS

DOOR SEALED PRESSURE SWITCH

THEORY OF OPERATION

The pressure switch detects the pressure applied to the chamber door gasket. When the pressure exceeds 18 to 20 PSIG, two internal switches are activated (closed) and the chamber door is considered sealed.

FIGURE 9–13. PRESSURE SWITCH OPERATION



Chamber Pressure (AI 03)
Interlock
NO
C
NC
NO
C
NC
Pressure Switch 4S
Door Sealed (DI 02)
Seal Door (DO 10)
Control Box 2A
Steam In
1PT
Pressure Transducer
10SV
2UJ4
1JS
3JI
11JO
12JO
Gasket Headring
Control End Door
Remote End Door
Unseal Door (DO 11)
A08215-AE
12SV
Vacuum/Drain

One of the switches functions as an electromechanical safety device in the door interlock circuit. When activated, it enables power to the Steam to Chamber output (DO 00). When it is open, it prevents steam from entering the chamber.

The other switch is used by the control system to sense when the door is sealed and unsealed. When it is closed, it activates DI 02, the control system considers the door to be sealed and a cycle can be started.

TESTING THE PRESSURE SWITCH

WARNING

SHOCK HAZARD: 24 Vac is present on the terminals of the pressure switch. Turn OFF power to the sterilizer when connecting the test lamp and when adjusting the pressure switch.

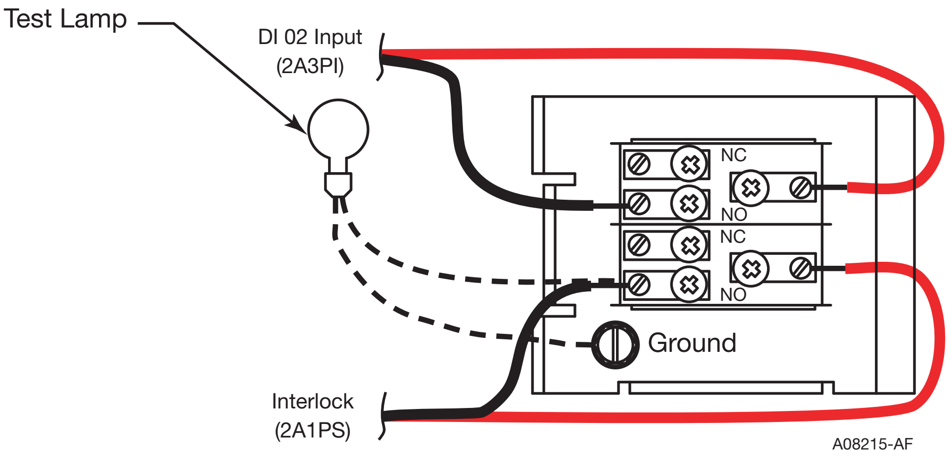
Tools and Materials:

- test lamp (or voltmeter/continuity tester)

To test the operation of the pressure switch and safety interlock:

1. Close but do not seal the chamber door(s), then turn OFF the circuit breaker.
2. Remove the cover from the pressure switch.
3. Identify the switch that is connected to the door interlock circuit (the cable from the door interlock is labeled 2A1PS).
4. Connect a 24 Vac test lamp or voltmeter between the normally open (NO) contact of the door interlock switch and ground.

FIGURE 9–14. PRESSURE SWITCH TEST



5. Turn ON the circuit breaker and open the control box cover to view the digital input and output LEDs:
   a. Confirm the test lamp is OFF (interlock open).
   b. Confirm the DI 02 LED is OFF.
6. Using manual mode (see *“Viewing and Operating the Digital Outputs” on page 8–22*), attempt to pressurize the chamber by turning ON digital output DO 00 (Steam to Chamber)
7. Confirm the Steam to Chamber solenoid valve does not energize.

8. Set all digital outputs back to AUTO mode and seal the door(s).
   a. Confirm the door gasket is pressurized (door cannot be opened.
   b. Confirm DI 02 LED is ON.
   c. Confirm the test lamp is ON (interlock closed)
9. Unseal the door:
   a. Confirm the door gasket is not pressurized.
   b. Confirm the test lamp turns OFF.

ADJUSTING THE PRESSURE SWITCH

NOTE
The pressure switch is adjusted at the factory and should seldom require readjustment.

The pressure switch has two internal switches/ Although each switch is capable of being adjusted at different settings, both are set to activate (close) at 20 PSIG and deactivate (open) at 18 PSIG (dead band of 2 PSI)

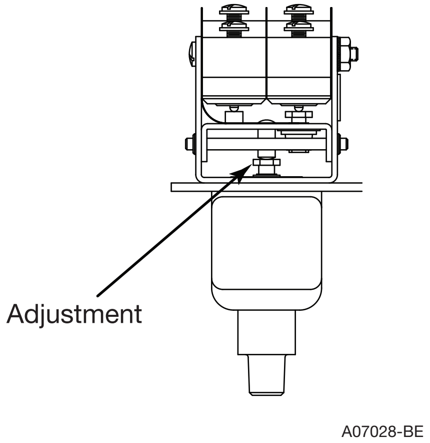
NOTE
Long term drift settings of 16 to 25 PSIG are acceptable.

In order to accurately confirm or adjust the setting of the pressure switch, it should be disconnected from the sterilizer piping and connected to a pressure source with a regulator and pressure gauge. An alternate method is to incrementally regulate and monitor the pressure/vacuum to the door gasket while sealing or unsealing the door.

To adjust the setting:

1. Remove the switch cover.
2. Locate the adjustment screw that protudes from the pressure vessel module.

FIGURE 9–15. PRESSURE SWITCH ADJUSTMENT



3. Adjust the screw clockwise to increase the pressure; counterclockwise to decrease it.

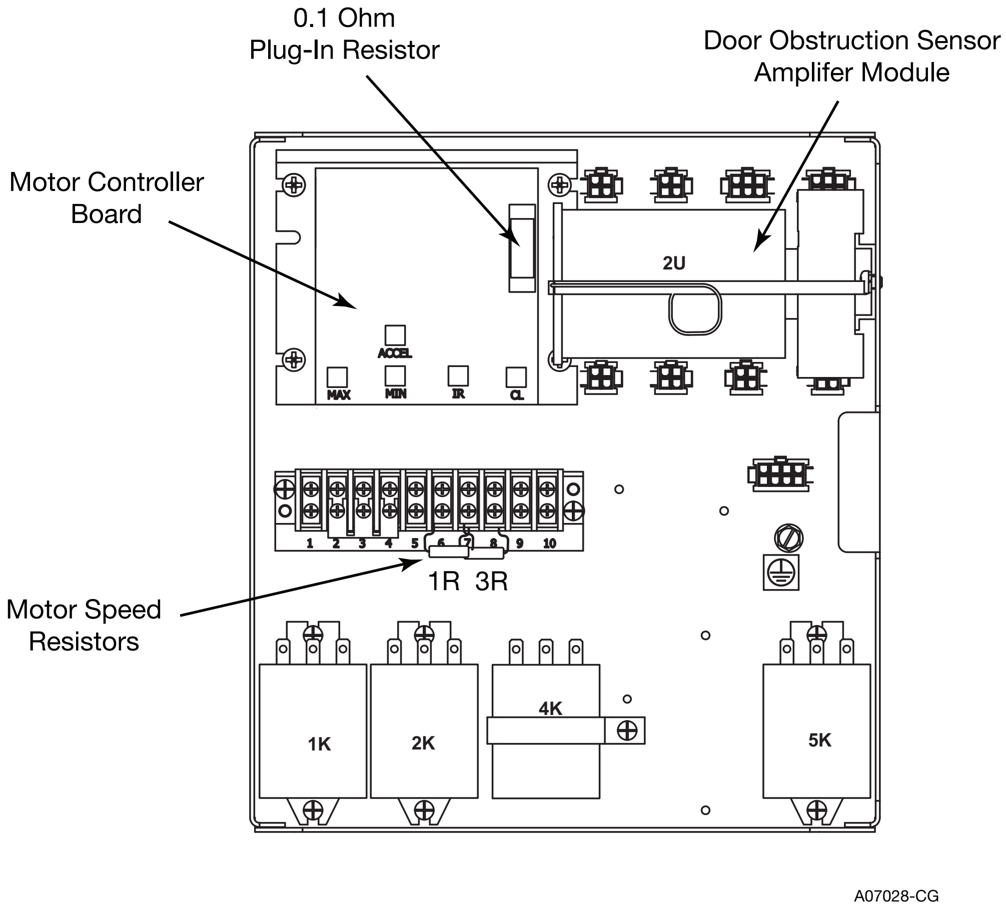
☞ ***NOTE***

The secondary adjustment screw that is between one of the switches and the transfer pivot arm assures that both switches activate/deactivate at the same time and do not require adjustment.

DOOR I/F BOX

The Door I/F Box (15A and 16A) contains the door control relays, motor controller board, and an amplifier module for the door obstruction sensing circuit.

FIGURE 9–16. DOOR I/F BOX INTERNAL COMPONENTS


0.1 Ohm
Plug-In Resistor
Door Obstruction Sensor
Amplifer Module
Motor Controller
Board
2U
ACCEL
MAX
MIN
IR
CL
1
2
3
4
5
6
7
8
9
10
1R 3R
Motor Speed
Resistors
4K
1K
2K
5K
A07028-CG

MOTOR CONTROL CIRCUIT

Refer to *Figure 6–13 on page 6–29*. The speed of the door motor is determined by the voltage divider formed by resistors 1R and 3R. The 0.1 ohm resistor on the motor controller board is matched to the horsepower of the motor.

CAUTION

Adjusting any of the trimpots may affect the settings of the other trimpots. The trimpots are factory-adjusted to their optimum settings and should not require further adjustment.

The five trimpots on the motor controller board provide the following fine adjustments:

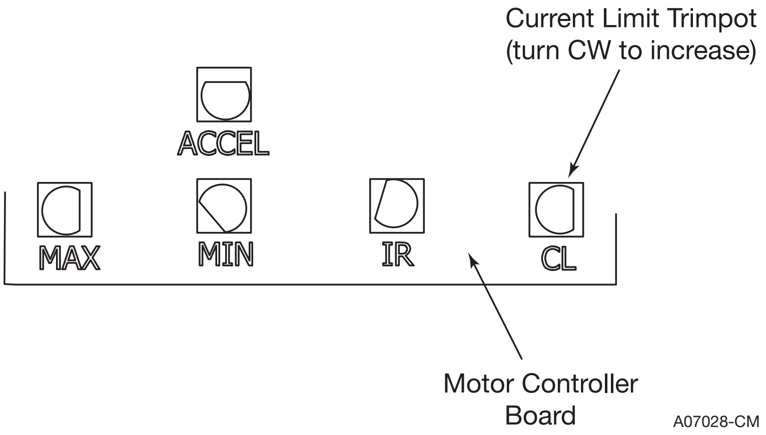
- MAX reduces the maximum speed to a value less than full speed.
- MIN increases the minimum speed to a value more than zero.

- ACCEL is factory set for acceleration from 0 to full speed over approximately 2 seconds.
- CL is factory set to limit the current approximately 75% of the motor rating.
- IR fine tunes the IR compensation for optimum motor regulation.

The correct positions of the trimpots are shown on Figure 6–8, Sheet 1 on page 6–20. When troubleshooting the motor circuit, verify the trimpot settings match those on the assembly drawing.

If the door motor stalls before reaching the door closed position, the CL trimpot may be increased. Rotate the CL trimpot clockwise to increase the current limit setting.

FIGURE 9–17. CURRENT LIMIT ADJUSTMENT



DOOR OBSTRUCTION SENSING CIRCUIT

The amplifier module (2U) inside the Door I/F Box (15A or 16A) has DIP switches and a gain adjustment. The amplifier module is configured for 20% hysteresis (switch 1=ON), 0.3 ms response time (switch 2=ON/switch 3=OFF), and light operate mode (switch 4=ON). Since light operate mode is selected, the output will energize relay 5K (CE Door Not Obstructed input DI 03 or RE Door Not Obstructed input DI 07) when there is sufficient light (i.e., the light beam between the photo eye transmitter and receiver is not blocked). The gain potentiometer adjusts the sensitivity of the amplifier.

The amplifier module is factory-adjusted and should not require further adjustment. The correct DIP switch settings and gain adjustment position are shown on *Figure 6–8, Sheet 1 on page 6–20*. When troubleshooting the door obstruction sensing circuit, verify the amplifier module settings match those on the assembly drawing.

STEAM BOILER PRESSURE CONTROLS

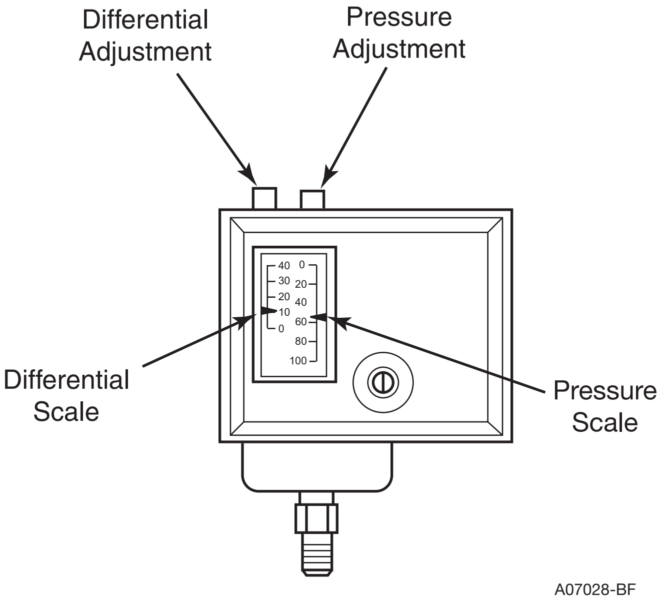
The pressure controls are factory-set and seldom require adjustment. Turning the adjustment screw(s) located on top of the pressure control changes the set point visible through the window on the front of the control.

ADJUSTING THE OPERATING PRESSURE CONTROL

To adjust the OPERATING PRESSURE control switch:

1. Turn OFF the boiler power switch.

FIGURE 9–18. OPERATING PRESSURE CONTROL


Differential Adjustment
Pressure Adjustment
40
30
20
10
0
0
20
40
60
80
100
Differential Scale
Pressure Scale
A07028-BF

2. Turn the right adjustment screw until the pressure scale indicates 55 psi.

3. Turn the left adjustment screw until the differential scale indicates 10 psi.

4. Turn ON the boiler power switch.

5. Observe the boiler pressure as it heats up. Verify the pressure control turns the heating element contactors on and off at the set point pressures.

ADJUSTING THE HI-LIMIT PRESSURE CONTROL

To adjust the HI-LIMIT pressure control switch:

1. Turn OFF the boiler power switch.
2. Turn the adjustment screw until the pressure scale indicates 70 psi.
3. Turn ON the power switch.

NOTE

Operation of the HI-LIMIT pressure control may be checked by setting the OPERATING PRESSURE control slightly higher than the HI-LIMIT set point (e.g., 75 PSI). Observe the boiler pressure as it heats up. The heating element contactors should turn off at the HI-LIMIT set point. Set the OPERATING PRESSURE control back to its normal setting when finished.

WATER-SAVER TEMPERATURE SWITCH

Tools and Materials:

- digital thermometer

CHECKING THE TEMPERATURE SWITCH

To check the temperature switch:

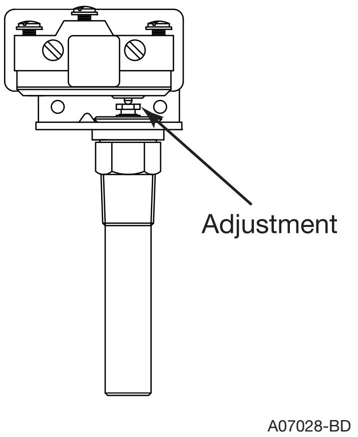
1. See *“Checking the Water-Saver Temperature” on page 4–36*.
2. Adjust the switch if the water temperature exceeds 115°F (46°C).

ADJUSTING THE TEMPERATURE SWITCH

To adjust the pressure switch:

1. Remove the cover of the temperature switch.
2. Using a 1/4 inch open-end wrench, turn the stem counterclockwise to lower the temperature setting.

FIGURE 9–19. TEMPERATURE SWITCH



3. Turn on the hot water and retest until the water solenoid is energized whenever the water temperature rises above 115°F (46°C).
4. Verify the solenoid valve turns off the cold water supply when the tank temperature is lowered to approximately 96°F (36°C).
5. Use the ball valve at the circulating pump inlet to drain the tank, then refill the tank.
6. After the correct temperature is attained, replace the temperature switch cover.

PIPING SYSTEM ADJUSTMENTS

MANUAL SHUTOFF VALVES

STEAM TO DOOR(S) VALVE

CAUTION
During normal operation, the STEAM TO DOOR(S) valve must be OPEN to allow steam to pressurize the gasket. After performing manual gasket retraction, be sure to OPEN the valve.

During manual gasket retraction, the STEAM TO DOOR(S) valve is closed to shut off the steam to the door gasket piping.

VACUUM TO DOOR(S) VALVE

CAUTION
During normal operation, the VACUUM TO DOOR(S) valve must be CLOSED to maintain the door seal. After performing manual gasket retraction, be sure to CLOSE the valve.

During manual gasket retraction, the VACUUM TO DOOR(S) valve is opened to retract the door gasket.

FLOW CONTROL VALVES

CHAMBER BLEED VALVE 1X

CAUTION
During normal operation, the chamber bleed valve is CLOSED. After performing manual gasket retracting or draining the chamber for servicing, be sure to close the valve.

During manual gasket retraction, the chamber bleed valve is opened to dissipate residual steam from the chamber. During sterilizer maintenance, the chamber bleed valve may be opened if necessary to drain the chamber.

JACKET BLEED VALVE 2X

CAUTION
During normal operation, the jacket bleed valve must be CLOSED. After draining the jacket for servicing, be sure to CLOSE the valve.

During sterilizer maintenance, the jacket bleed valve may be opened if necessary to drain the jacket.

JACKET PRESSURE GAUGE VALVE 3X

CAUTION
During normal operation, the jacket pressure gauge valve must be OPEN. After replacing the jacket pressure gauge, be sure to OPEN the valve.

Close the jacket pressure gauge valve during replacement of the pressure gauge. Open the valve after the gauge is replaced.

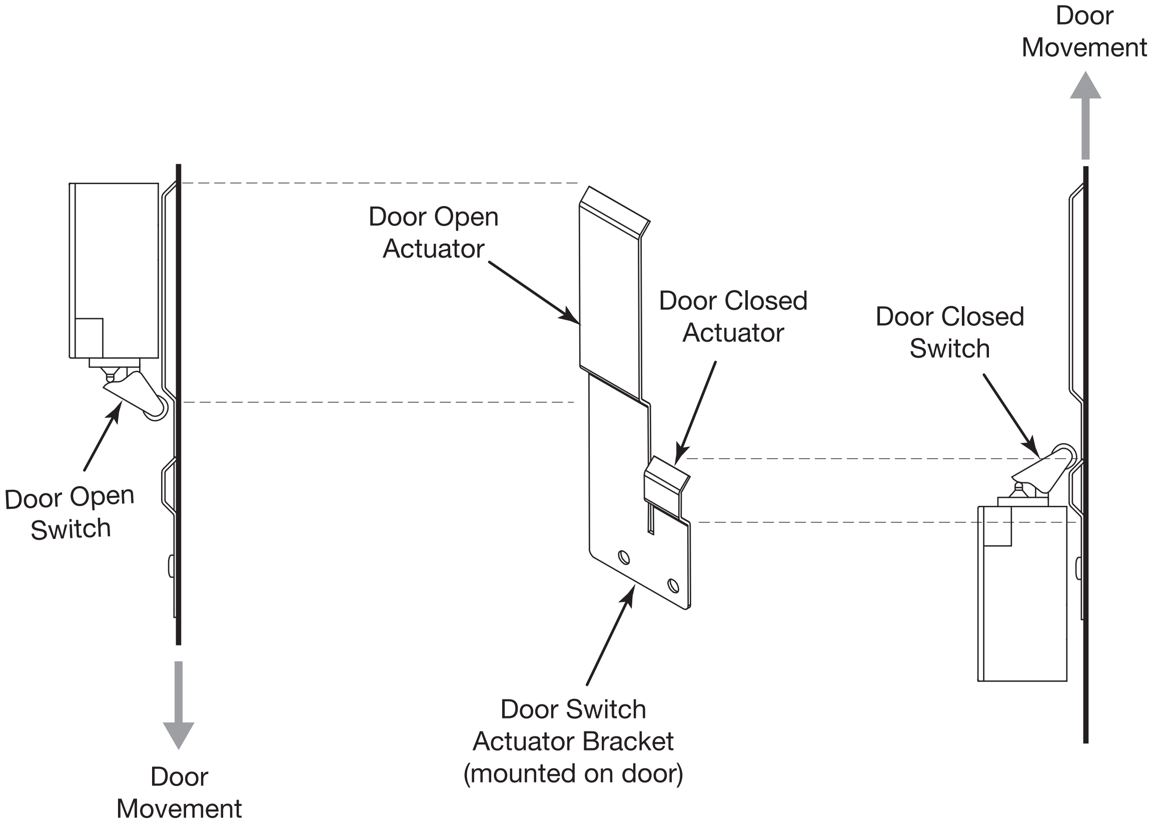
DOOR ADJUSTMENTS

DOOR SWITCHES

DOOR SWITCH ACTUATOR BRACKET

The door switch actuator bracket (mounted on the side of the door plate) has two ridges. The long ridge on the left actuates the door open switch roller as the door moves downward to the open position. The short ridge on the right actuates the door closed switch roller when the door moves upward into the closed position.

FIGURE 9–20. DOOR SWITCH ACTUATOR BRACKET


Door Movement
Door Open Actuator
Door Closed Actuator
Door Closed Switch
Door Open Switch
Door Switch Actuator Bracket (mounted on door)
Door Movement

A07028-CD

NOTE

The door closed switch uses two sets of contacts. The normally closed (N.C.) contacts provide the Door Not Closed input (DI 01 or DI 05) to the control system. The normally open (N.O.) contacts are used as a door interlock that enables steam to the door gasket when the door is closed.

ADJUSTING THE DOOR CLOSED SWITCH

Refer to Figure 9–21. The door closed switch is strapped to the door switch mounting bracket, which is attached to the bracket mounting plate. The mounting plate is secured to the upright extrusion by T-nuts, which slide to allow the mounting plate to be adjusted vertically.

FIGURE 9–21. DOOR CLOSED SWITCH

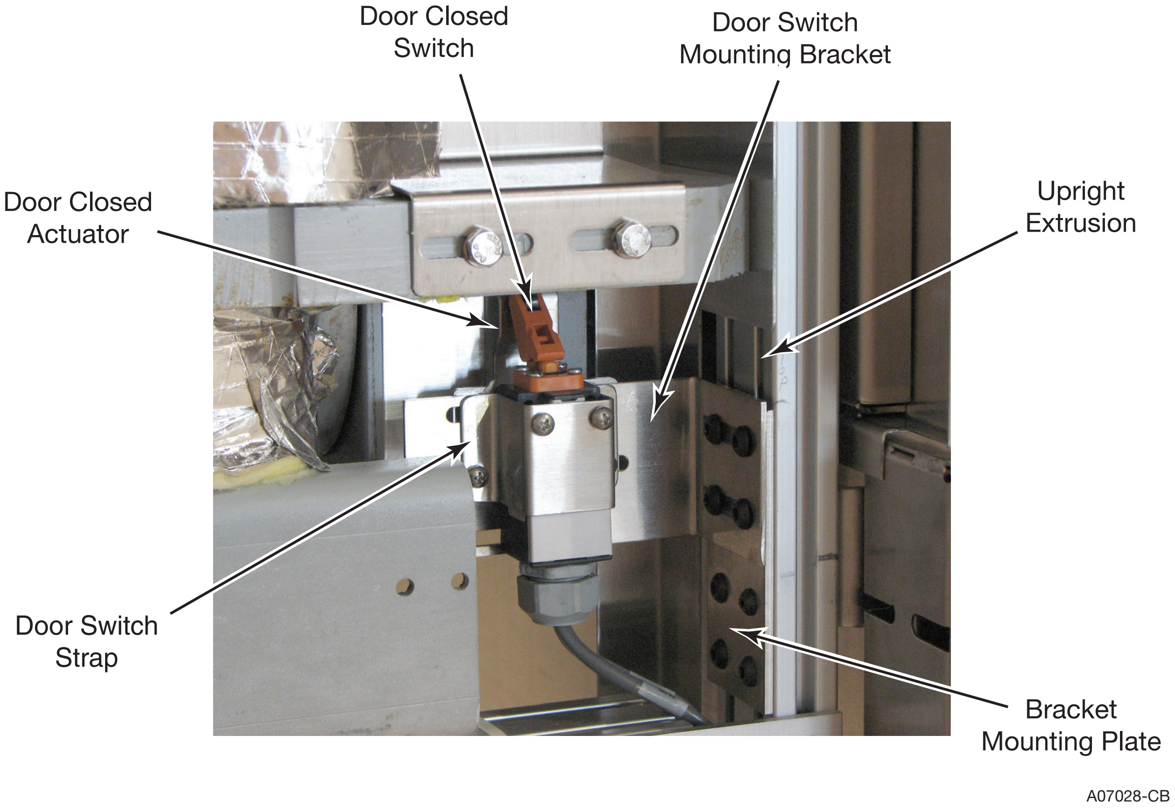
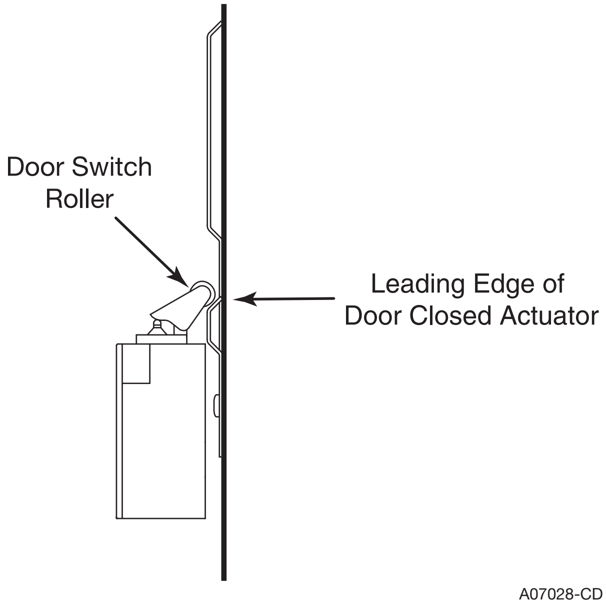

Door Closed Switch
Door Switch Mounting Bracket
Door Closed Actuator
Upright Extrusion
Door Switch Strap
Bracket Mounting Plate
A07028-CB

FIGURE 9–22. DOOR CLOSED SWITCH ACTUATION


Door Switch Roller
Leading Edge of Door Closed Actuator
A07028-CD

To adjust the door closed switch:

1. The door switch roller should contact the leading edge of the actuator just before the door reaches its fully closed position.

CAUTION
Do not overtighten the screws that secure the mounting plate to the upright extrusion. Tightening the hardware more than 15 ft-lbs may warp the extrusion.

   If vertical adjustment is necessary, loosen the four screws that secure the mounting plate to the upright extrusion (this allows the T-nuts to slide in the extrusion). After adjustment, tighten the hardware to 10 ft-lb.

2. The switch arm must actuate the switch button as the roller moves over the actuator.

   If adjustment is necessary, loosen the four screws that secure the switch mounting bracket to the mounting plate. Move the bracket/switch assembly toward or away from the actuator as required. Tighten the mounting screws.

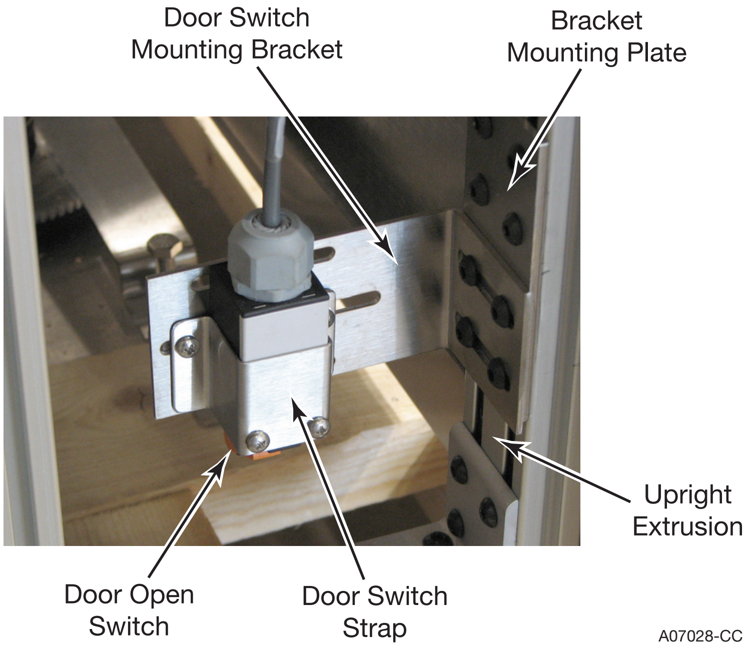
3. The switch roller should be horizontally centered on the door closed actuator.

   If adjustment is necessary. loosen the two screws that secure the door switch/strap assembly to the mounting bracket. Slide the switch laterally, then tighten the mounting screws.

ADJUSTING THE DOOR OPEN SWITCH

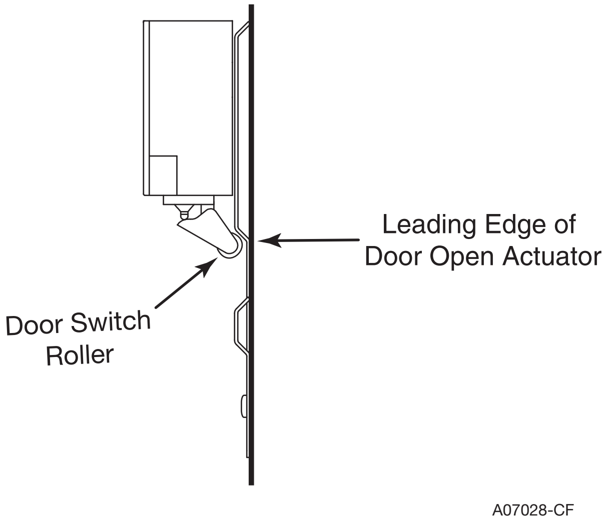
Refer to Figure 9–23. The door open switch is strapped to the door switch mounting bracket, which is attached to the bracket mounting plate. The mounting plate is secured to the upright extrusion by T-nuts, which slide to allow the mounting plate to be adjusted vertically.

FIGURE 9–23. DOOR OPEN SWITCH


Door Switch Mounting Bracket
Bracket Mounting Plate
Upright Extrusion
Door Open Switch
Door Switch Strap
A07028-CC

The door open switch stops the door before it reaches its fully open position. When the door is opened for loading and unloading the chamber, the door cover does not extend below the door gasket (i.e., the gasket is only partially visible). When replacing the gasket, the door must be manually lowered beyond its normal open position (see *“Replacing the Door Gasket” on page 4–17*). This is why the door open actuator has a longer plateau than the door closed actuator.

FIGURE 9–24. DOOR OPEN SWITCH ACTUATION


Leading Edge of Door Open Actuator
Door Switch Roller
A07028-CF

To adjust the door open switch:

1. The door switch roller should contact the leading edge of the actuator just before the door reaches its normal open position (partially hiding the bottom of the door gasket.

CAUTION

Do not overtighten the screws that secure the mounting plate to the upright extrusion. Tightening the hardware more than 15 ft-lbs may warp the extrusion.

   If vertical adjustment is necessary, loosen the four screws that secure the mounting plate to the upright extrusion (this allows the T-nuts to slide in the extrusion). After adjustment, tighten the hardware to 10 ft-lb.

2. The switch arm must actuate the switch button as the roller moves over the actuator.

   If adjustment is necessary, loosen the four screws that secure the switch mounting bracket to the mounting plate. Move the bracket/ switch assembly toward or away from the actuator as required. Tighten the mounting screws.

3. The switch roller should be horizontally centered on the door open actuator.

   If adjustment is necessary. loosen the two screws that secure the door switch/strap assembly to the mounting bracket. Slide the switch laterally, then tighten the mounting screws.

DOOR ALIGNMENT

TOOLS AND MATERIALS

- jumper plug (PN 61301600775)
- 2 ft. spirit level
- torpedo level
- try square or tape measure
- alignment pins (located in holder on right side of sterilizer)
- torque driver set

VERIFYING THE CHAMBER IS LEVEL

To verify that the chamber is level:

1. Open the door.
2. Refer to *Figure 9–26 on page 9–33*. Place a level vertically against the chamber wall to verify the chamber is level from side-to-side. If the chamber is not level, adjust the leveling feet as required.
3. Place a level vertically against the door gasket headring to verify the chamber is level from front-to-back. If the chamber is not level, adjust the leveling feet as required.

☞ ***NOTE***

The minimum distance from the bottom of the foot block to the finished floor should be 2.25 inches (57 mm) at all four corners (see Figure 9–25). This clearance is required for the installation of the kick panel(s) and optional cabinet panels.

FIGURE 9–25. MINIMUM DISTANCE FROM FINISHED FLOOR

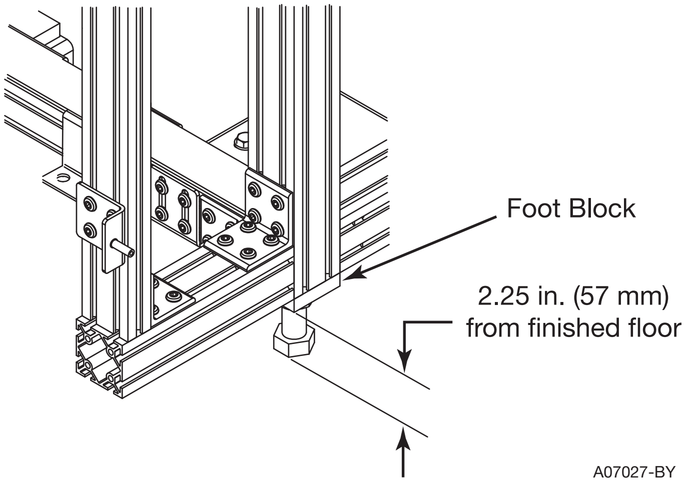
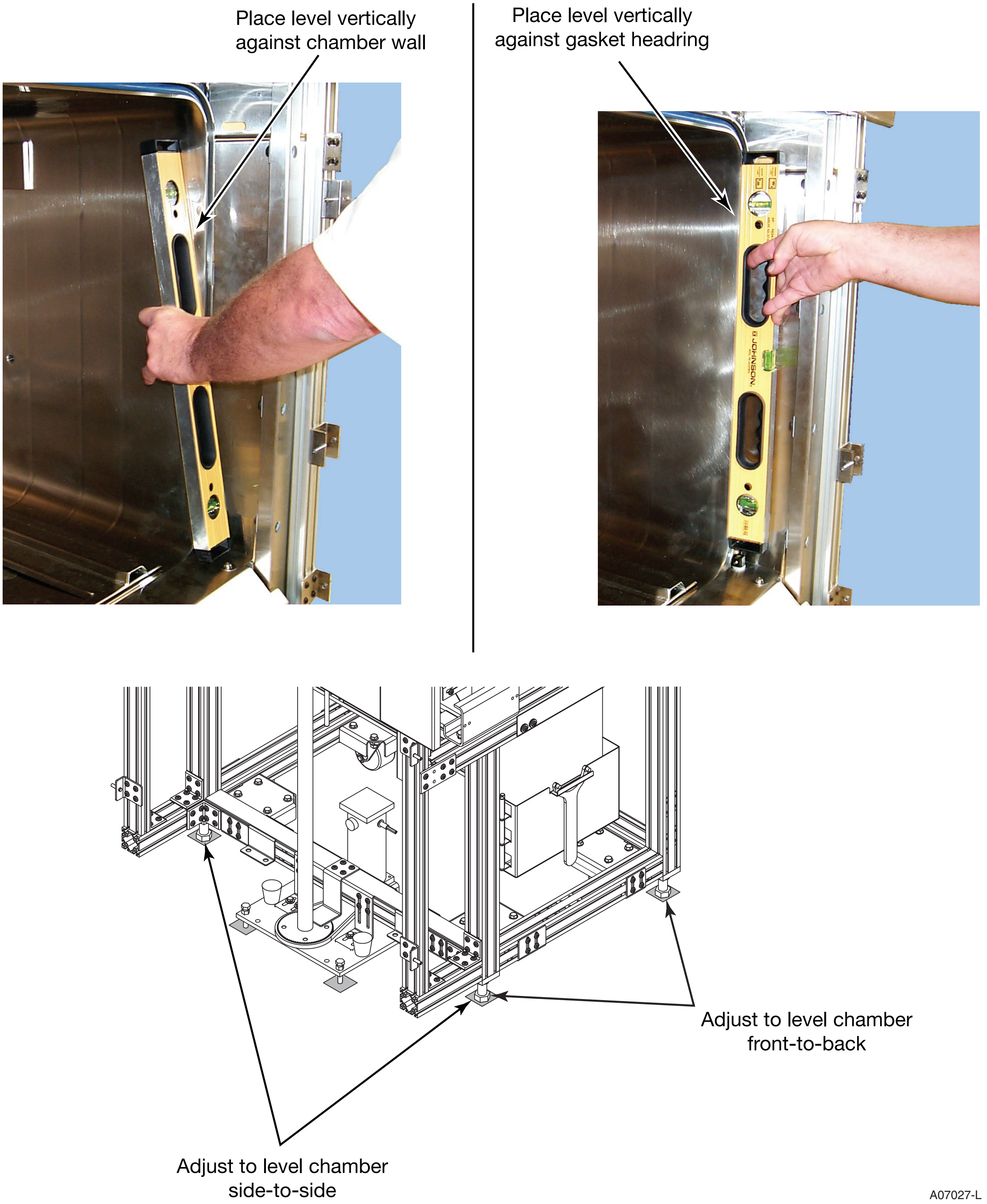


FIGURE 9–26. LEVELING THE STERILIZER CHAMBER

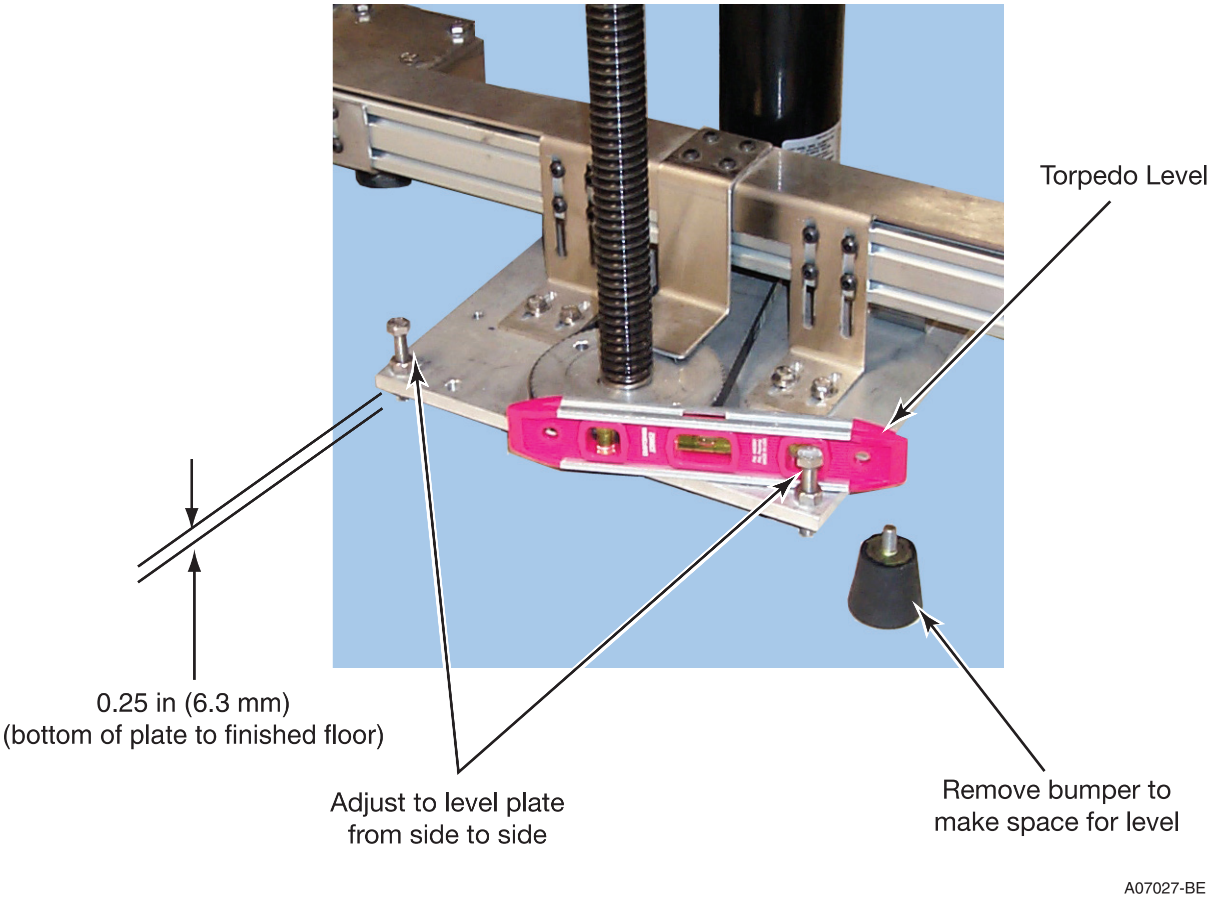

Place level vertically against chamber wall
Place level vertically against gasket headring
Adjust to level chamber front-to-back
Adjust to level chamber side-to-side
A07027-L

VERIFYING THE MOTOR MOUNTING PLATE IS LEVEL

To verify that the motor mounting plate is level:

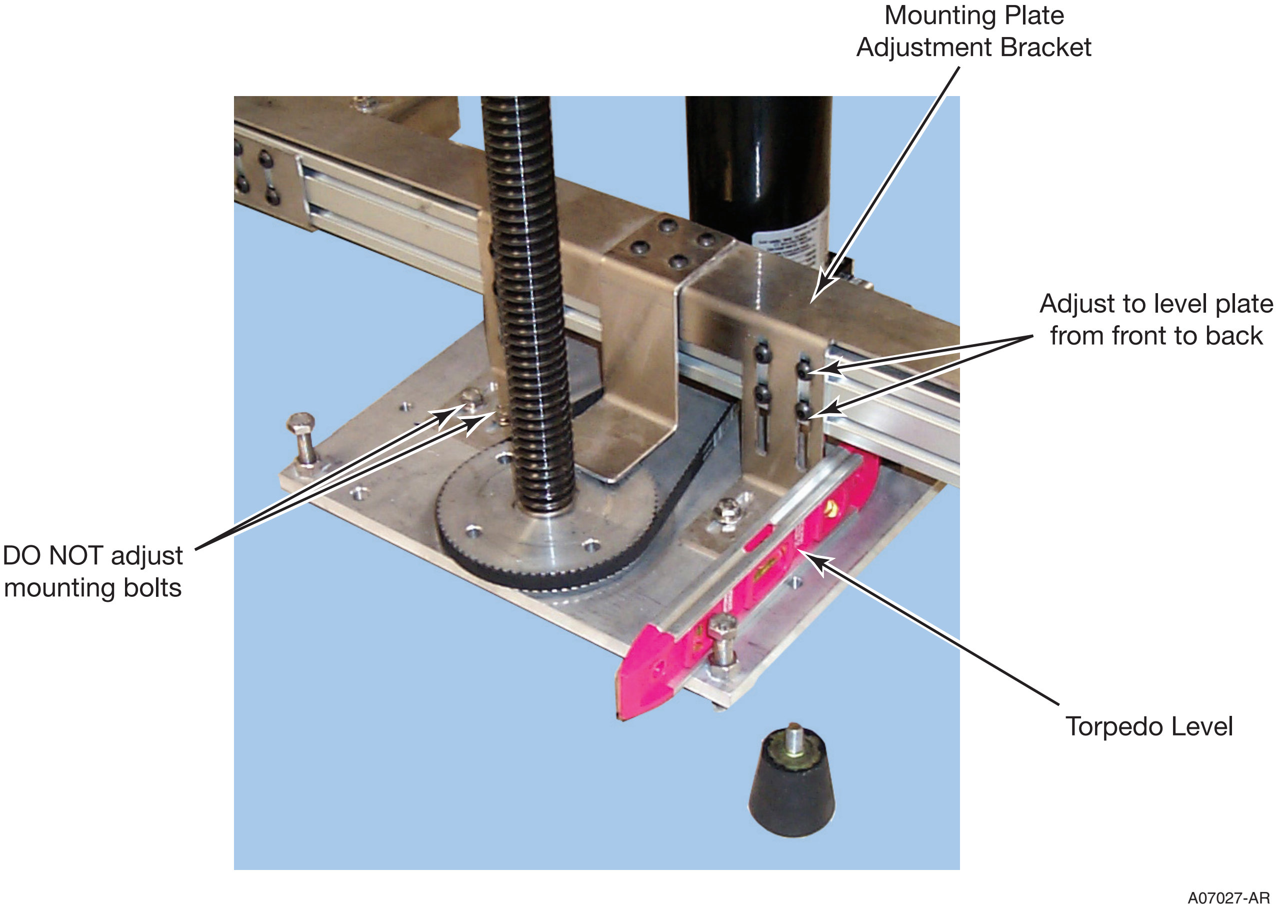
1. Remove the rubber bumpers from the door motor mounting plate. This will allow a 9 inch torpedo level to be placed on the mounting plate.
2. Verify the bottom of the mounting plate is 0.25 in. (6.3 mm) minimum above the finished floor.

FIGURE 9–27. MOUNTING PLATE LEVELING BOLTS


Torpedo Level
0.25 in (6.3 mm)
(bottom of plate to finished floor)
Adjust to level plate
from side to side
Remove bumper to
make space for level
A07027-BE

3. Position the level as shown in Figure 9–27 and verify that the mounting plate is level from side-to-side. If the mounting plate is not level, adjust the front mounting bolts as necessary.

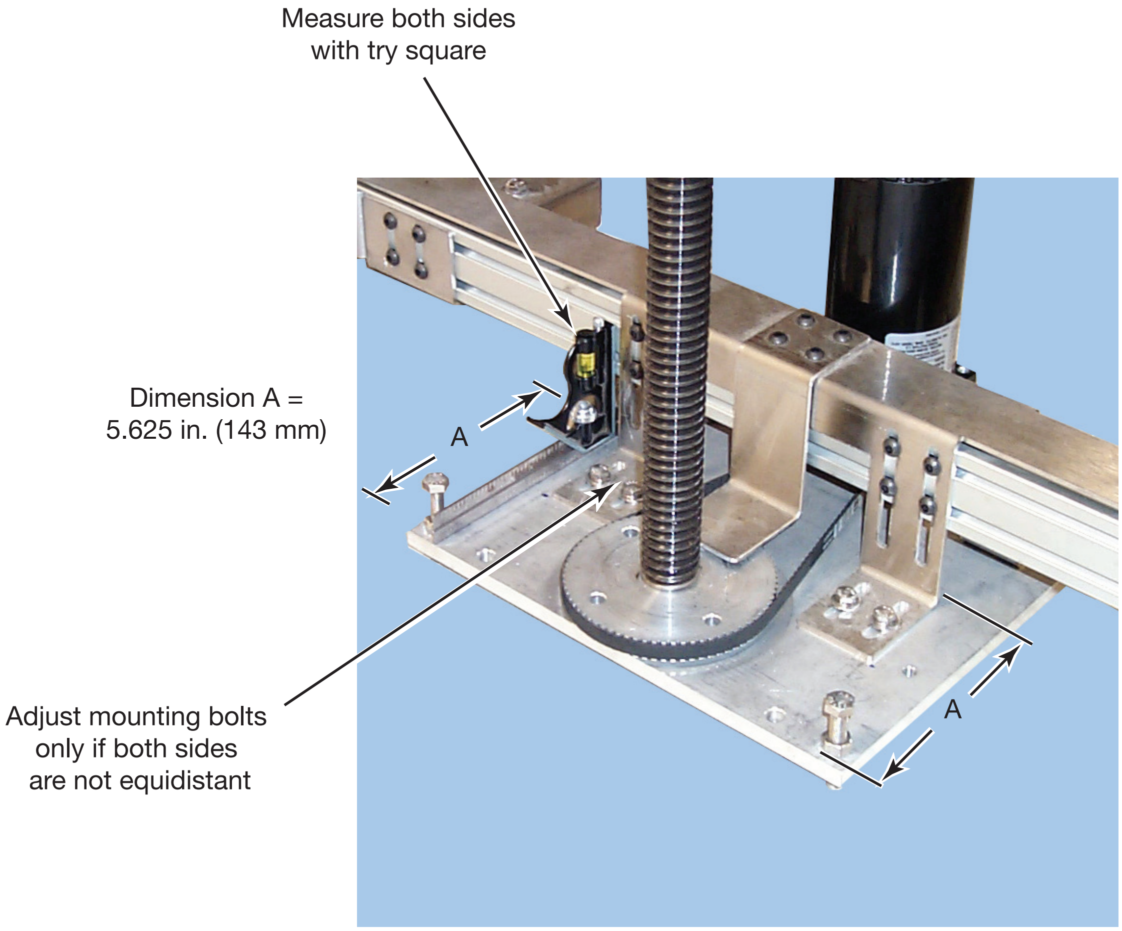
FIGURE 9–28. MOUNTING PLATE ADJUSTMENT BRACKETS


Mounting Plate Adjustment Bracket
Adjust to level plate from front to back
DO NOT adjust mounting bolts
Torpedo Level
A07027-AR

CAUTION
Do not adjust the bolts that secure the mounting plate adjustment bracket to the mounting plate.

4. Position the level as shown in Figure 9–28 and verify that the mounting plate is level from front-to-back. If the mounting plate is not level:
    a. Loosen the hardware that secures the mounting plate adjustment bracket to the extrusion.
    b. Reposition the mounting plate adjustment bracket as required.
    c. Tighten the hardware that secures the bracket to the extrusion.

FIGURE 9–29. CHECKING FOR SQUARENESS



Measure both sides with try square

Dimension A = 5.625 in. (143 mm)

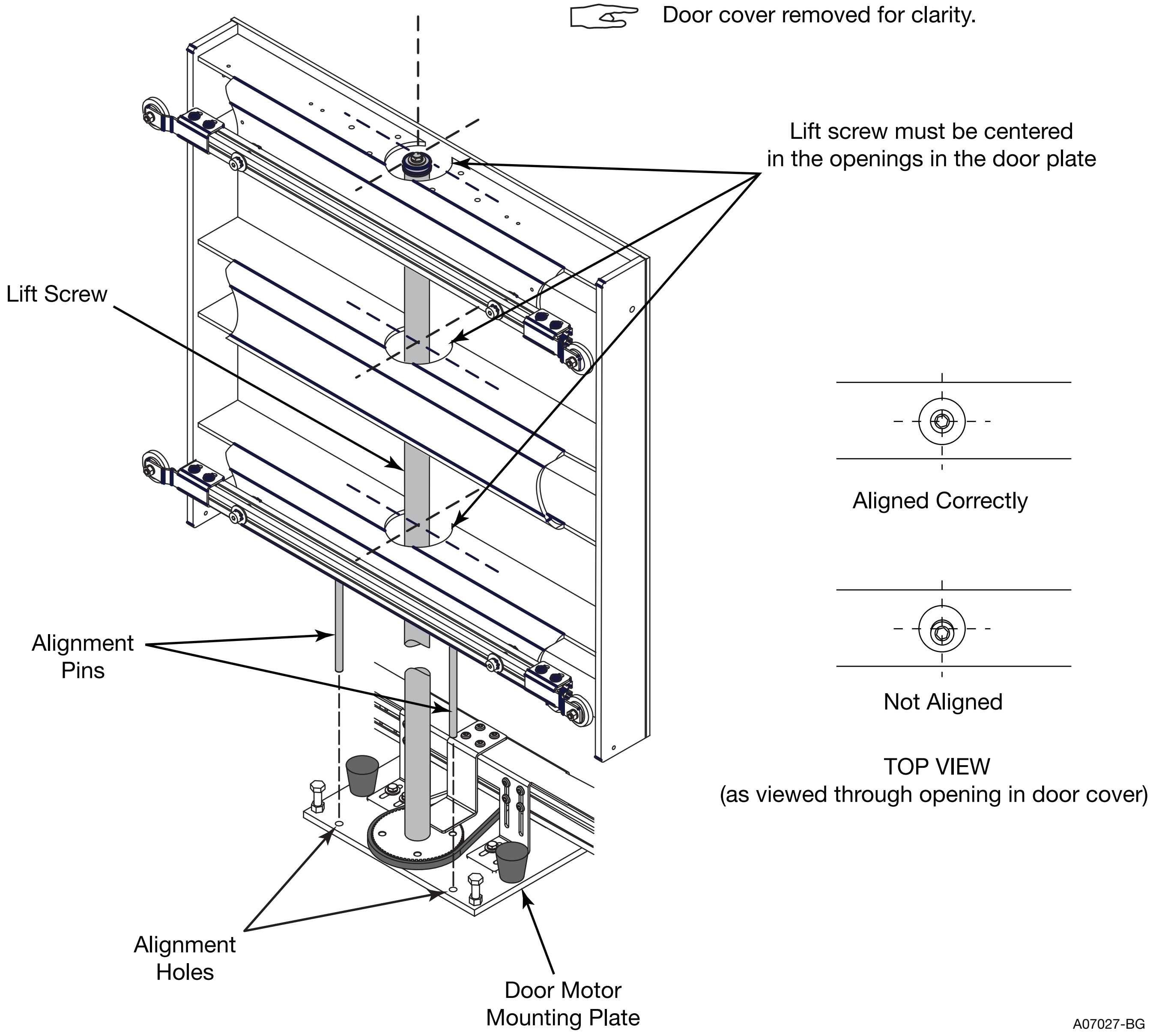
Adjust mounting bolts only if both sides are not equidistant

A07027-CC

5. Refer to Figure 9–29. Using a try square (or tape measure), measure the distance from the front edge of the mounting plate to the bend in the mounting bracket. Confirm that this dimension is 5.625 in. (143 mm). Measure both the left and right sides of the mounting plate.

6. If the measurements on the left and right side of the mounting plate are equidistant, the mounting plate is square and no adjustment is required. If not loosen the bolts that secure the mounting bracket to the plate and adjust the mounting plate as required.

FIGURE 9–30. LIFT SCREW ALIGNMENT



Door cover removed for clarity.

Lift screw must be centered in the openings in the door plate
Lift Screw
Aligned Correctly
Not Aligned
TOP VIEW
(as viewed through opening in door cover)
Alignment Pins
Alignment Holes
Door Motor Mounting Plate
A07027-BG

NOTE

The alignment pins are stored on the sides of the spanner wrench holder on the right side of the unit.

---

7. Refer to Figure 9–30. Insert the door alignment pins into the threaded holes in the bottom of the door plate. Verify the alignment pins are centered over the holes in the mounting plate.

8. Remove the plug from the top of the door cover and check that the lift screw is vertically centered in the openings in the door plate.

9. If the lift screw is not concentric, readjust the mounting plate as required and recheck for levelness.

10. Remove the door alignment pins and store them in the sides of the spanner wrench holder.

11. Reinstall the door bumpers.

12. Run the door up and down and check that the door slides smoothly. If the leveling adjustments did not correct the problem, proceed with "*Aligning the Door*".

ALIGNING THE DOOR

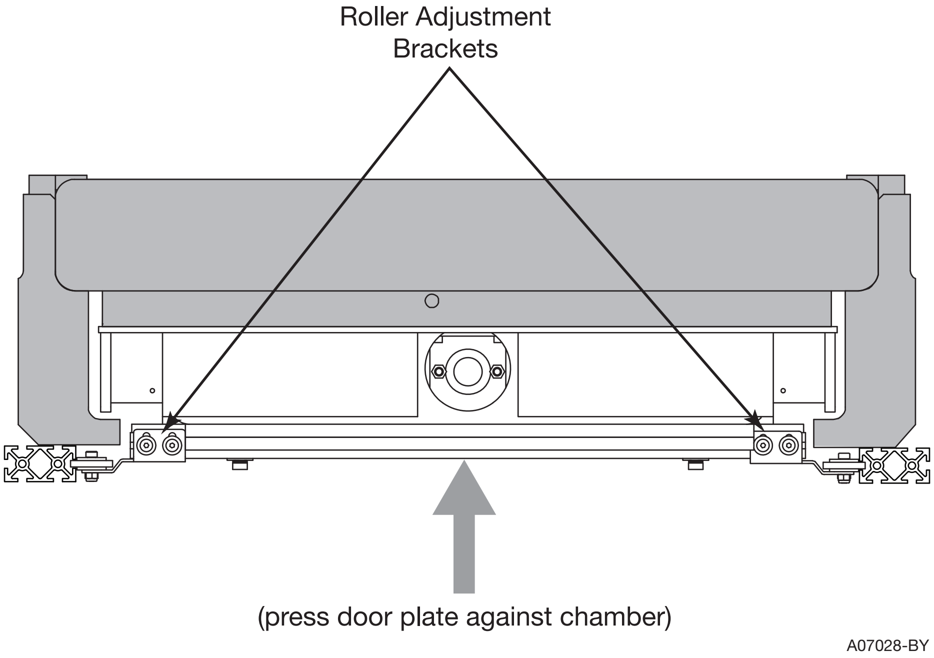
To align the door:

1. Bypass the door obstruction sensors. See *"Bypassing the Door Obstruction Sensors (Service Mode)" on page 4–5*.

2. Remove the door cover. See *"Removing the Door Cover" on page 4–6*.

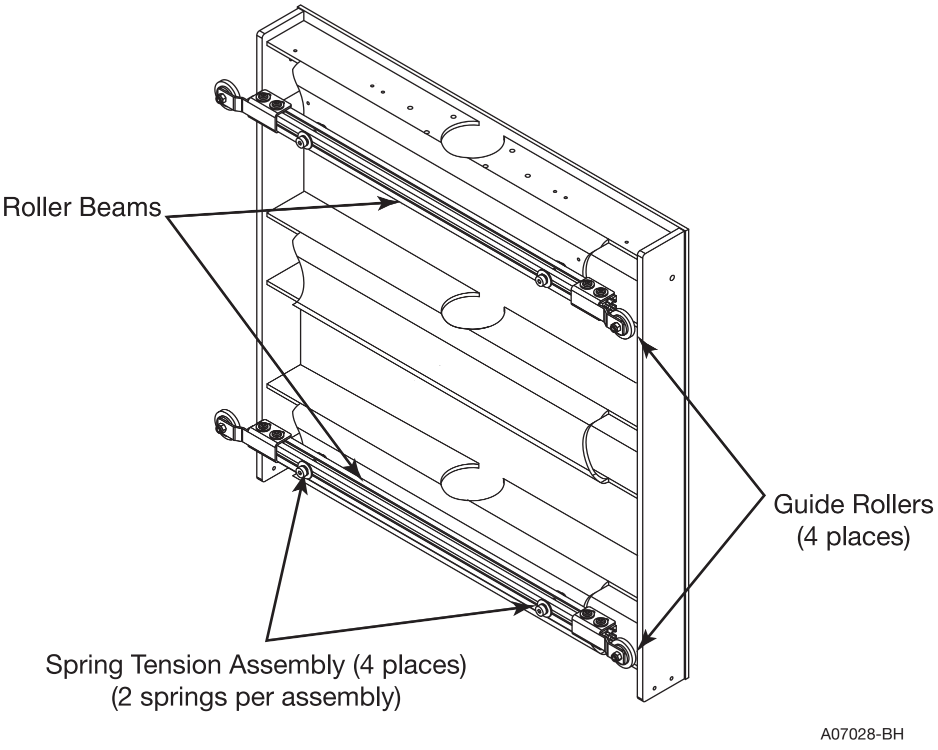
3. Raise the door.

FIGURE 9–31. ALIGNING THE DOOR PLATE WITH THE CHAMBER


Roller Adjustment Brackets
(press door plate against chamber)
A07028-BY

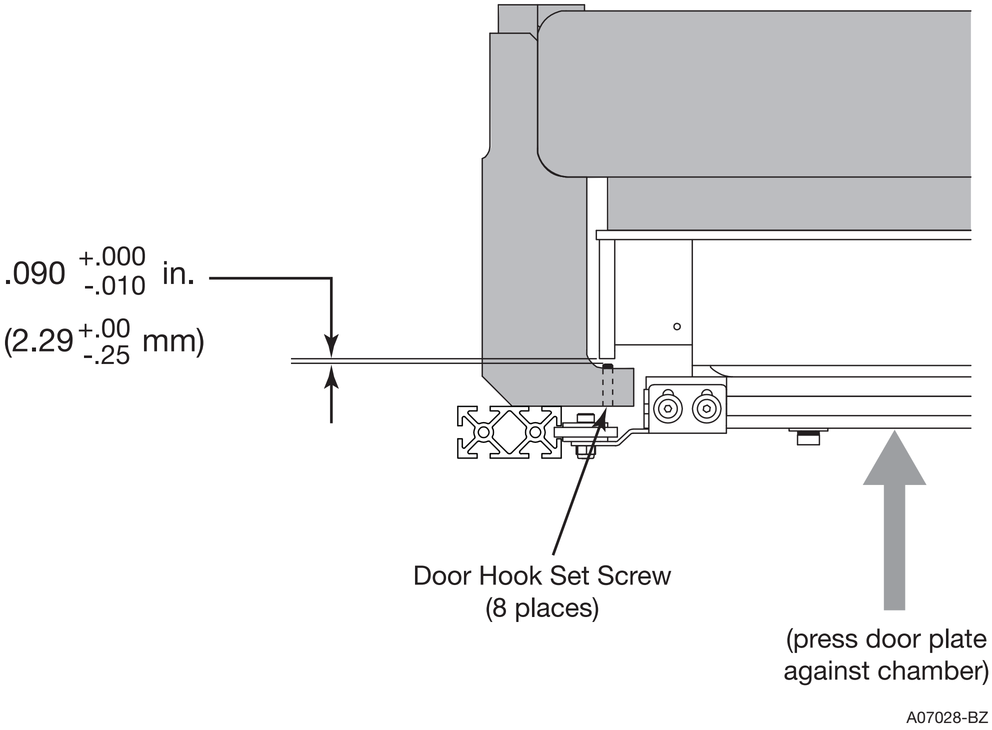
4. Refer to Figure 9–31. Press the door plate against the chamber. Check that the door is square with the chamber at both the top and bottom.

FIGURE 9–32. GUIDE ROLLERS AND TENSION SPRINGS


Roller Beams
Guide Rollers
(4 places)
Spring Tension Assembly (4 places)
(2 springs per assembly)
A07028-BH

5. Adjust the door rollers (see Figure 9–32) as necessary to align the door:
   a. Adjust the top rollers.
   b. Run the door up and down.
   c. If the door operates smoothly, adjust the bottom rollers.

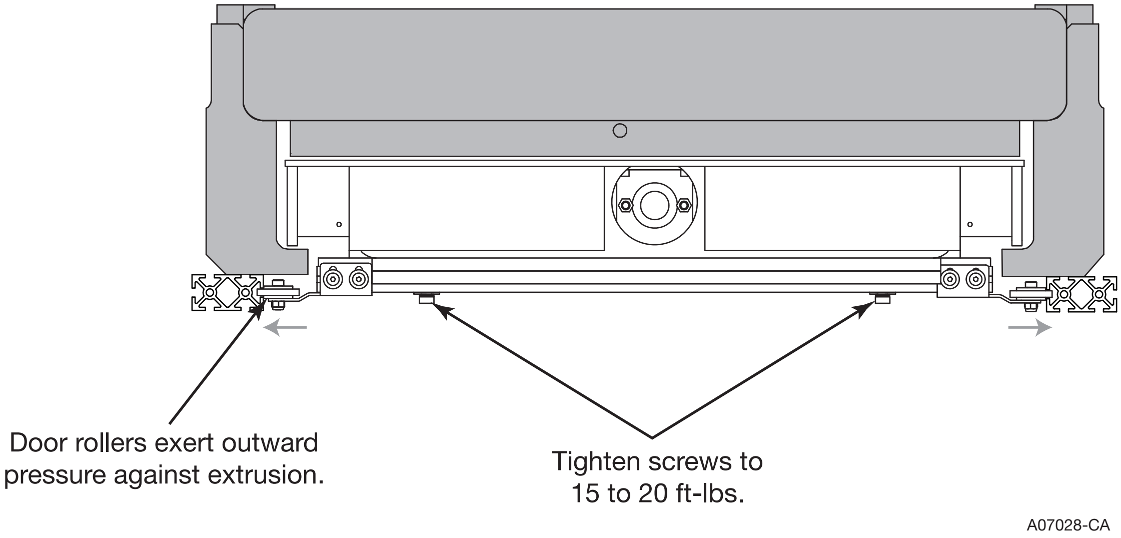
FIGURE 9–33. DOOR HOOK GAP ADJUSTMENT


.090 +.000 -.010 in.
(2.29 +.00 -.25 mm)
Door Hook Set Screw (8 places)
(press door plate against chamber)
A07028-BZ

6. Refer to Figure 9–33. With the door pressed against the chamber, measure the gap between the door hook set screws and the door plate.

7. Adjust the set screws for a gap of 0.090 in. (2.29 mm) with the tolerance shown in Figure 9–33.

FIGURE 9–34. GUIDE ROLLER TENSION


Door rollers exert outward pressure against extrusion.
Tighten screws to 15 to 20 ft-lbs.
A07028-CA

8. Run the door up and down and check that the door slides smoothly. When properly aligned, the spring tension on the roller beam should cause the rollers to exert outward pressure against the extrusion (see Figure 9–34).

9. Reinstall the door cover and reconnect the photo eye sensors.
10. Remove the jumper from 14J inside the Door I/F Box.
11. Set DS20 Service Mode to 0.

SECTION 10 REPAIR AND REPLACEMENT

CONTROL SYSTEM COMPONENTS

TEMPERATURE SENSORS (RTDS)

REPLACING A TEMPERATURE SENSOR

Three temperature sensors are standard on this equipment:

- Chamber RTD 1RT senses the chamber temperature (measured at the chamber drain).
- Jacket RTD 2RT senses the jacket temperature.
- Drain RTD 5RT senses the temperature of the water discharged at the sterilizer drain.

WARNING

BURN HAZARD: All steam lines will be hot! Shut off the main steam supply and depressurize steam in the system before removing transducer probes. Ensure that all liquids are drained from the system.

SHOCK HAZARD: Turn OFF the mains circuit breaker before replacing the transducer probes.

CAUTION

Be sure to insert the temperature sensors to the correct depth so that they will give accurate temperature readings (see Figure 10–2 on page 10–3).

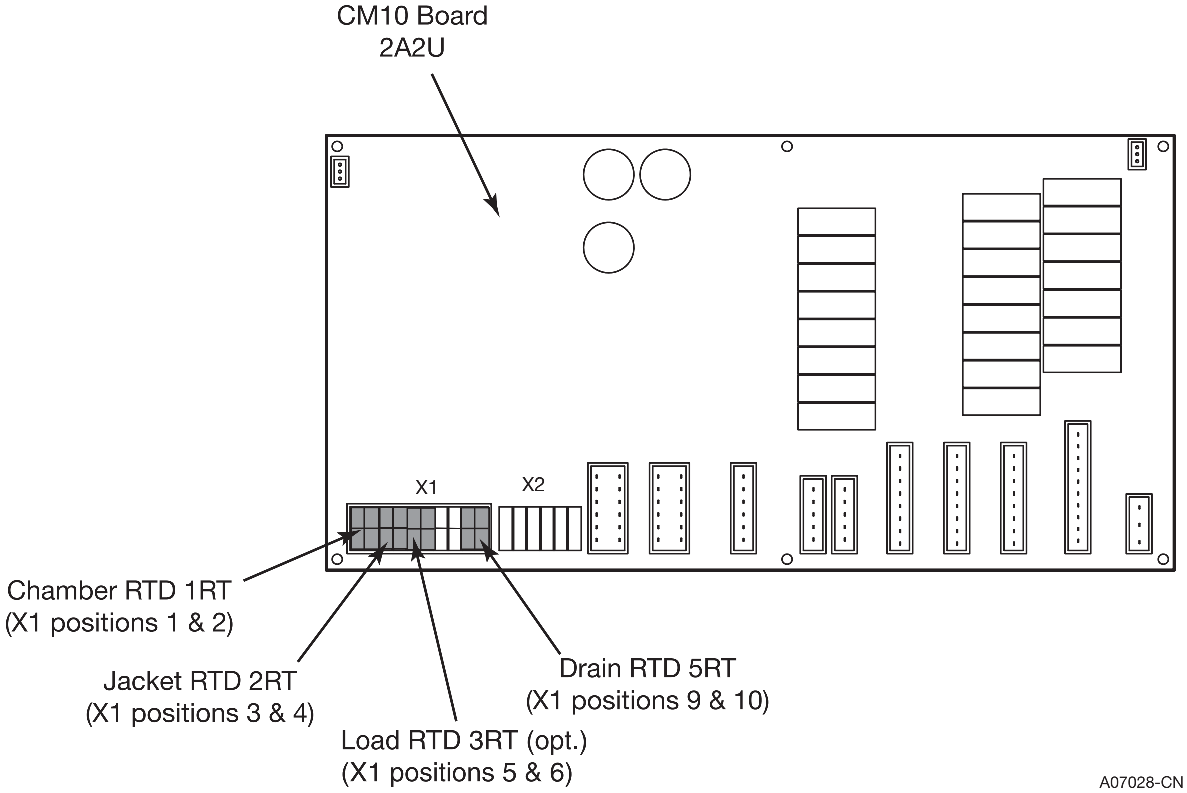
Wear a grounding strap at all times when inside the control box. Otherwise, damage to the electronic components can result.

ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES
ESD

To replace a temperature sensor:

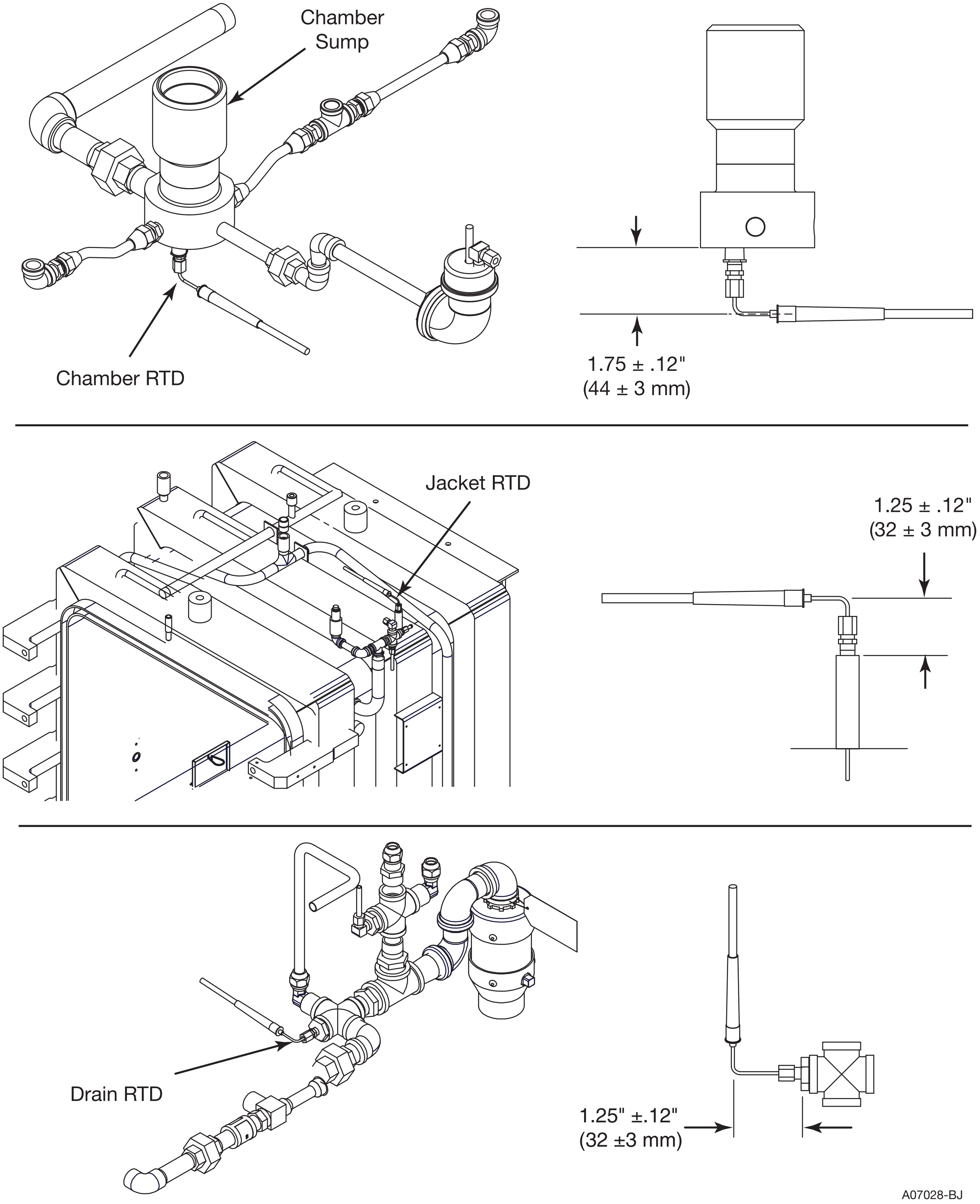
1. Disconnect the RTD cable from the CM10 board.

FIGURE 10–1. RTD CONNECTIONS ON CM10 BOARD


CM10 Board
2A2U
X1
X2
Chamber RTD 1RT
(X1 positions 1 & 2)
Jacket RTD 2RT
(X1 positions 3 & 4)
Load RTD 3RT (opt.)
(X1 positions 5 & 6)
Drain RTD 5RT
(X1 positions 9 & 10)
A07028-CN

2. Loosen and remove the old temperature sensor.
3. Insert the new temperature sensor into the existing fitting.
4. Measure the insertion depth (see *Figure 10–2 on page 10–3*):
    - Insert the chamber RTD 1.75 ±.12 inches (44 ± 3 mm).
    - Insert the jacket RTD 1.25 ±.12 inches (32 ± 3 mm).
    - Insert the drain RTD 1.25 ±.12 inches (32 ± 3 mm).
5. Tighten the fitting.
6. Connect the RTD cable to the CM10 Board
7. Calibrate the temperature sensor(s) after replacement.

FIGURE 10–2. TEMPERATURE SENSOR INSERTION DEPTHS


Chamber
Sump
Chamber RTD
1.75 ± .12"
(44 ± 3 mm)
Jacket RTD
1.25 ± .12"
(32 ± 3 mm)
Drain RTD
1.25" ±.12"
(32 ±3 mm)
A07028-BJ

PRESSURE TRANSDUCER

REPLACING THE PRESSURE TRANSDUCER

NOTE

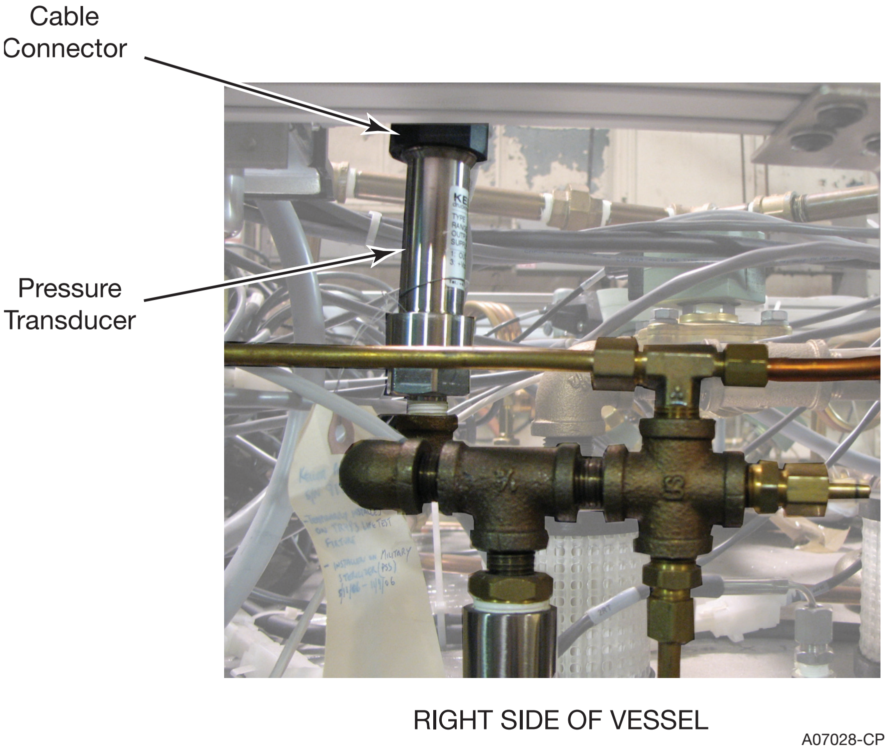
The pressure transducer for the PACS 3500 control system is different from the one used by the PACS 3000 system. The pressure transducer does not have a resistor set or table of bridge compensation values.

After replacing the pressure transducer, check the calibration as described in "Checking the Calibration" on page 9–3. If the pressure value is not within range, the analog input circuit on the CM10 board is the cause of the drift. Replace the CM10 board.

To replace the pressure transducer:

1. Replace the pressure transducer:
   a. Disconnect the electrical cable from the transducer
   b. Loosen and remove the old pressure transducer from its fitting.
   c. Install the new pressure transducer.
   d. Connect the electrical cable to the new transducer.

FIGURE 10–3. PRESSURE TRANSDUCER



2. Press [SETUP].

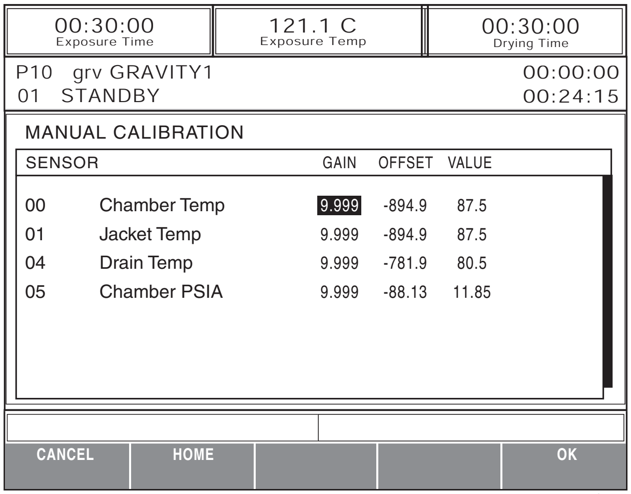
CALIBRATION ACCESS REQUIRED

3. Select SYSTEM MENU > enter password > CALIBRATION > MANUAL.

4. Press ENTER.

   The MANUAL CALIBRATION screen appears.

FIGURE 10–4. MANUAL CALIBRATION SCREEN



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

MANUAL CALIBRATION

SENSOR		GAIN	OFFSET	VALUE
00	Chamber Temp	9.999	-894.9	87.5
01	Jacket Temp	9.999	-894.9	87.5
04	Drain Temp	9.999	-781.9	80.5
05	Chamber PSIA	9.999	-88.13	11.85

5. Enter the gain and offset values:
   a. Select the 05 Chamber PSIA input.
   b. Set the gain to 1.000.
   c. Set the offset to 0.000.

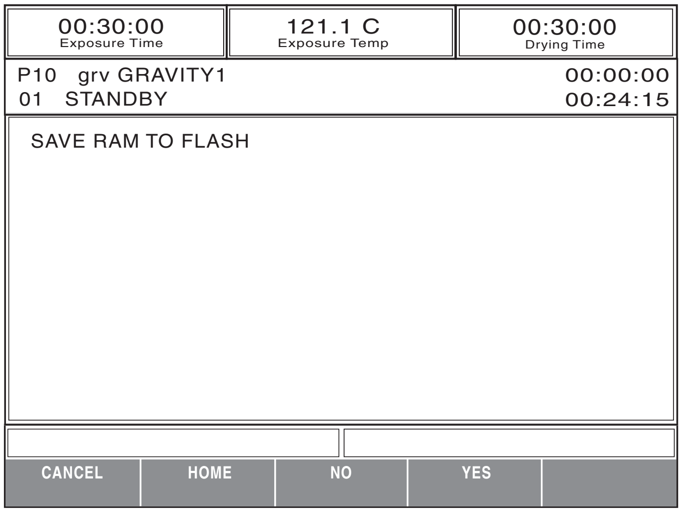
SERVICE
ACCESS REQUIRED

6. Select SYSTEM MENU > enter password > SAVE RAM TO FLASH.

7. Press ENTER.

   The SAVE RAM TO FLASH screen appears.

FIGURE 10–5. SAVE RAM TO FLASH SCREEN



00:30:00 Exposure Time | 121.1 C Exposure Temp | 00:30:00 Drying Time

P10 grv GRAVITY1 00:00:00
01 STANDBY 00:24:15

SAVE RAM TO FLASH

8. Press [YES].
    - The loading process takes approximately 10 to 15 seconds.
    - During the loading process, a “Saving RAM to FLASH” progress message appears.

   If the screen displays an error message:
    - Verify that the EPROM is properly seated.
    - If necessary, replace the EPROM (see *“Replacing the Flash EPROM” on page 10–8*).

FLASH EPROM

Tools and Materials:

- Wrist strap, grounding
- PLCC extraction tool (PN 61301603001)
- Non-conductive cold start tool
- Cycle assignments worksheet:
  - *Figure A–1 on page A–3*
  - *Figure A–2 on page A–5*
- Cycle worksheets:
  - *Figure A–3 on page A–7*
  - *Figure A–4 on page A–8*
  - *Figure A–5 on page A–9*
  - *Figure A–6 on page A–10*
  - *Figure A–7 on page A–11*
  - *Figure A–8 on page A–12*
  - *Figure A–9, Sheet 1 on page A–14*
  - *Figure A–10, Sheet 1 on page A–16*
  - *Figure A–11 on page A–18*
  - *Figure A–12 on page A–19*
- Configuration worksheet:
  - *Figure A–13 on page A–21*
  - *Figure A–14 on page A–23*

REPLACING THE FLASH EPROM

CAUTION
IMPORTANT: Be sure to record the customer's settings, pressure transducer data, calibration data, and sterilizer configuration settings BEFORE removing the existing EPROM. This information is erased when the CPU memory is cleared.

ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES
ESD

Observe handling precautions for devices sensitive to ESD (ElectroStatic Discharge) when working in the Control Box. Otherwise, damage to the equipment could result:

Always wear a grounding wrist strap when working in the Control Box or handling ESD-sensitive devices.

Keep ESD-sensitive components in their static-shielding bags until it is time to install them in the sterilizer.

NOTE
Check if the customer has already written down the settings using the cycle worksheets included in the User Manual.

There are two ways to record the customer's cycle settings:

- Select each cycle, view the parameters, compare them with the factory settings, and mark any changes on a cycle worksheet.
- Print out the cycle programs using the DOCUMENTATION menu (see *"Printing a Program Listing" on page 5–31*). The cycle programs can be printed out individually.

NOTE
Printing out all the cycle programs will take more than an hour. It may be more efficient to write down the settings using the cycle worksheets in Appendix A.

To replace the flash EPROM:

1. Record the customer's settings:
    a. Press [SELECT CYCLE].
    b. Write down the cycle assignments in the space provided in *"633HC Cycle Assignments Worksheet" on page A–3* or *"633LS Cycle Assignments Worksheet" on page A–5*.
    c. Select the first cycle.
    d. Press [PARAMETERS] to view the cycle.

e. Compare the parameter settings with the factory settings on the cycle worksheet. Write down any changes.

  - Prevac cycles—use *“633HC Prevacuum Cycle Worksheet” on page A–7* or *“633LS Prevacuum Cycle Worksheet” on page A–14*.
  - Gravity cycles—use *“633HC Gravity Cycle Worksheet” on page A–8* or *“633LS Gravity Cycle Worksheet” on page A–16*.
  - Flash 3+ cycles—use *“633HC Flash 3+ Cycle Worksheet” on page A–9*.
  - Flash 10+ cycles—use *“633HC Flash 10+ Cycle Worksheet” on page A–10*.
  - Liquids cycle—use *“633HC Liquids Cycle Worksheet” on page A–11* or *“633LS Liquids Cycle Worksheet” on page A–18*.
  - Vacuum Leak Test Cycle—use *“633HC Vacuum Leak Test Cycle Worksheet” on page A–12* or *“633LS Vacuum Leak Test Cycle Worksheet” on page A–19*.

f. Press [SETUP].

CONFIGURATION
ACCESS REQUIRED

g. Select SYSTEM MENU > enter password > CONFIGURATION > EXTENDED PARAMETERS.

h. Press ENTER.

The EDIT PARAMETERS screen appears (see *Figure 5–37 on page 5–43*).

i. Compare the extended parameter settings with the factory settings on the cycle worksheet. Write down any changes.

j. Press [HOME] to return to the process screen.

k. Repeat steps a. thru j. for the other cycles.

2. Record the sterilizer configuration:

a. Press [SETUP].

CONFIGURATION
ACCESS REQUIRED

b. Select SYSTEM MENU > enter password > CONFIGURATION > MACHINE NAME.

c. Press ENTER

The MACHINE NAME screen appears (see *Figure 5–33 on page 5–38*).

d. Write down thw machine NAME on the configuration worksheet (*“633HC Configuration Worksheet” on page A–21* or *“633LS Configuration Worksheet” on page A–23*).

e. Press [OK].

f. Select CONFIGURATION > LANGUAGE DATE UNITS.

g. Press ENTER.

The LANGUAGE DATE UNITS screen appears (see *Figure 5–35 on page 5–39*).

h. On the configuration worksheet:

- Circle the LANGUAGE.
- Circle the DATE FORMAT.
- Circle the PRESSURE UNIT.
- Circle the TEMP UNIT.

i. Press [OK].

j. Select CONFIGURATION > PANEL SETUP.

k. Press ENTER.

The PANEL SETUP screen appears.

l. On the configuration worksheet:

- Circle the DEFAULT MENU.
- Circle the PARAMETER EDIT mode.
- Write in the SCREENSAVER time.
- Circle the CONFIRM SAVE/CANCEL preference.

m. Press [OK] twice .

TIME SETTINGS
ACCESS REQUIRED

n. Select SYSTEM MENU > TIME SETTINGS > ALARM CLOCK.

o. Press ENTER.

The ALARM CLOCK screen appears (see *Figure 5–21 on page 5–24*).

p. Record the alarm clock settings:

- Auto Blow-down
- Ulities Off
- Utilities On

q. Press [OK]

3. Record the calibratiion data:

a. Open the sterilizer door. This will ensure that the chamber pressure is at atmosphere.

CALIBRATION
ACCESS REQUIRED

b. Select SYSTEM MENU > CALIBRATION > MANUAL.

c. Press ENTER.

The MANUAL CALIBRATION screen appears (see *Figure 5–23 on page 5–28*.

d. Write down the GAIN and OFFSET value for each sensor on the configuration worksheet:

- 00 Chamber Temp
- 01 Jacket Temp
- 02 Load Temp (633LS with Load Probe only)
- 04 Drain Temp
- 05 Chamber PSIA

e. Press [OK] twice to return to the SYSTEM MENU.

HARDWARE SETUP
ACCESS REQUIRED

4. Record the sterilizer hardware configuration (DIPSWITCHES):

a. Select SYSTEM MENU > DIP SWITCHES.

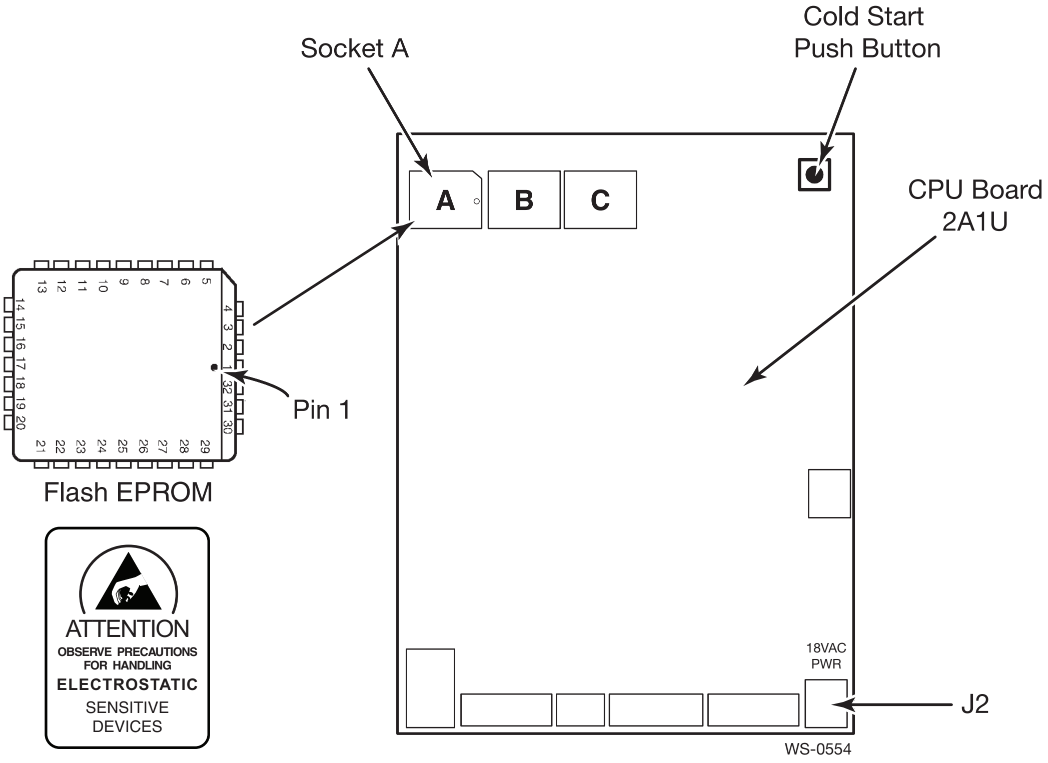
b. Press ENTER.

The DIP SWITCHES screen appears (see *Figure 5–40 on page 5–49* or *Figure 5–41 on page 5–51*).

NOTE
Only half of the switche settings are displayed at a time. Scroll down to view the remaining settings.

c. Press [PRINT] to print out the hardware configuration settings.

FIGURE 10–6. CPU BOARD 2A1UCP


Socket A
Cold Start Push Button
A
B
C
CPU Board 2A1U
5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29
30 31 32 1 2 3 4
Pin 1
Flash EPROM
ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES
18VAC PWR
J2
WS-0554

5. Remove the old EPROM.
   a. Unplug connector 2P from J2 on the CPU Board (see Figure 10–6). This disconnects the 18VAC supply from the CPU board.
   b. Find socket A on CPU Board 1U in Control Box 2A.
   c. Remove the existing EPROM using the PLCC extraction tool (PN 61301603001).

NOTE

The next step removes the existing program from the CPU Board memory.

---

6. Clear the CPU Board memory (cold start):
   a. Using your finger, press and hold the cold start button.
   b. Plug in connector 2P.
   c. Continue to hold the cold start button until the Power Up screen (GETINGE) appears (about 10 seconds).
   d. Then release the button.

7. Install the new EPROM:
   a. Verify the chamber door is open. (This will prevent the alarm from sounding).
   b. Unplug connector 2P.
   c. Align the new memory IC in socket A.
      - Orient the angled corner as shown (*see Figure 10–6 on page 10–11*).
      - Position the Pin 1 indent on the right.
   d. Press the memory IC firmly into the socket until it snaps into place.

8. Load the program from the new EPROM:
   a. Using your finger, press and hold the cold start button.
   b. Plug in connector 2P.
   c. Continue to hold the cold start button until the Power Up screen (GETINGE) appears (about 10 seconds). Then release the button.
   d. Press [SETUP].
   e. Select ABOUT.
   f. Press ENTER.

      The ABOUT screen appears.

   g. Compare the SDN and version displayed on the ABOUT screen with the information on the EPROM label. If the displayed software version number is not correct:
      - Unplug connector 2P and repeat step 6, making sure you hold the cold start button down long enough.
      - If necessary, report the problem to Technical Support.

   h. Adjust the brightness of the display if necessary.
   See *“Adjusting the Display Brightness” on page 5–15*.

   i. Write the new SDN on the existing label on the Control Box cover.

9. Enter the manual calibration data recorded on the worksheet:

   a. Verify the chamber door is open.

CALIBRATION
ACCESS REQUIRED

   b. Select SYSTEM MENU > enter password > CALIBRATION > MANUAL.

   c. Press ENTER.

   The MANUAL CALIBRATION screen appears.

   d. For each sensor, enter the GAIN and OFFSET values from the configuration worksheet.

   e. Press [SAVE] when finished.

   f. Press [OK] twice to return to the SYSTEM MENU.

10. Enter the sterilizer configuration (DIP switch) settings:

   a. Select DIPSWITCHES.

   b. Press ENTER.

   The DIPSWITCHES screen appears.

   c. Enter the settings from the printout.

   d. Press [SAVE} when finished.

   e. Press [OK] to return to the SYSTEM MENU.

11. Enter the customer’s settings:

CONFIGURATION
ACCESS REQUIRED

   a. Select CONFIGURATION > EDIT CYCLES.

   b. Press ENTER.

   The EDIT CYCLES screen appears.

   c. Enter the customer’s cycle names and numbers recorded on the cycle assignments worksheet (*see step 1 on* page 10–8).

   d. Press [OK].

   e. Select CONFIGURATION > MACHINE NAME.

f. Press ENTER.

The MACHINE NAME screen appears.

g. Enter the machine name recorded on the configuration worksheet (*see step 2 on page 10–9*).

h. Press [SAVE].

i. Press [OK].

j. Select CONFIGURATION > LANGUAGE DATE UNITS.

k. Press ENTER.

The LANGUAGE DATE UNITS screen appears.

l. Enter the customer’s settings recorded on the configuration worksheet.

m. Press [SAVE].

n. Press [OK]

o. Select CONFIGURATION > PANEL SETUP.

p. Press ENTER.

The PANEL SETUP screen appears.

q. Enter the customer’s settings recorded on the configuration worksheet.

r. Press [SAVE].

s. Press [OK].

TIME SETTINGS
🔒
ACCESS REQUIRED

t. Select TIME SETTINGS > ALARM CLOCK.

The ALARM CLOCK screen appears.

u. Enter the customer’s settings recorded on the configuration worksheet.

v. Press [SAVE].

w. Press [OK] to return to the SETUP menu.

12. Enter the customer’s cycle parameter settings on the cycle worksheets (see step 1 on *page 10–8*).

13. Save the RAM to the EPROM:

    a. Check that the process screen does not display any failure, fault, or informational messages. If it does, do any of the following to clear the message:

        - Press CLEAR ALARM.
        - Cycle the power using the circuit breaker on the power box, and press CLEAR ALARM.

    b. Select SYSTEM MENU > enter password > SAVE RAM TO FLASH.

c. Press ENTER.

The SAVE RAM TO FLASH screen appears.

d. Press [YES] and note the duration of the loading process and the display of the communication error message.

  - The loading process takes approximately 10 to 15 seconds.
  - During the loading process, a communication error is displayed.

e. If the communication error message disp-lays for only 3 seconds or less:

  i. Unplug connector 2P.

  ii. Check that the EPROM is seated properly. If not, reseat the EPROM.

  iii. Plug in connector 2P.

  iv. Repeat steps a. thru d.

If necessary, replace th EPROM.

14. Verify the operation of the sterilizer:

  a. Open the chamber door.

  b. Confirm that the pressure on the display is approximately equal to the atmospheric pressure at your location (in psia).

  c. Run several test cycles to verify the operation of the sterilizer.

NOTE
The first cycle may abort before completion. Additional cycles should run to completion.

Process at least two successful cycles in a row to verify proper operation.

CPU BOARD

Tools and Materials:

- Wrist strap, grounding
- PLCC extraction tool (PN 61301603001)
- Non-conductive cold start tool
- Cycle assignments worksheet:
  - *Figure A–1 on page A–3*
  - *Figure A–2 on page A–5*
- Cycle worksheets:
  - *Figure A–3 on page A–7*
  - *Figure A–4 on page A–8*
  - *Figure A–5 on page A–9*
  - *Figure A–6 on page A–10*
  - *Figure A–7 on page A–11*
  - *Figure A–8 on page A–12*
  - *Figure A–9, Sheet 1 on page A–14*
  - *Figure A–10, Sheet 1 on page A–16*
  - *Figure A–11 on page A–18*
  - *Figure A–12 on page A–19*
- Configuration worksheet:
  - *Figure A–13 on page A–21*
  - *Figure A–14 on page A–23*

REPLACING CPU BOARD 2A1U

CAUTION

IMPORTANT: Be sure to record the customer's settings, calibration data, and sterilizer configuration settings BEFORE removing the existing EPROM. This information is erased when the CPU memory is cleared.

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES
ESD

Observe handling precautions for devices sensitive to ESD (ElectroStatic Discharge) when working in the Control Box. Otherwise, damage to the equipment could result:

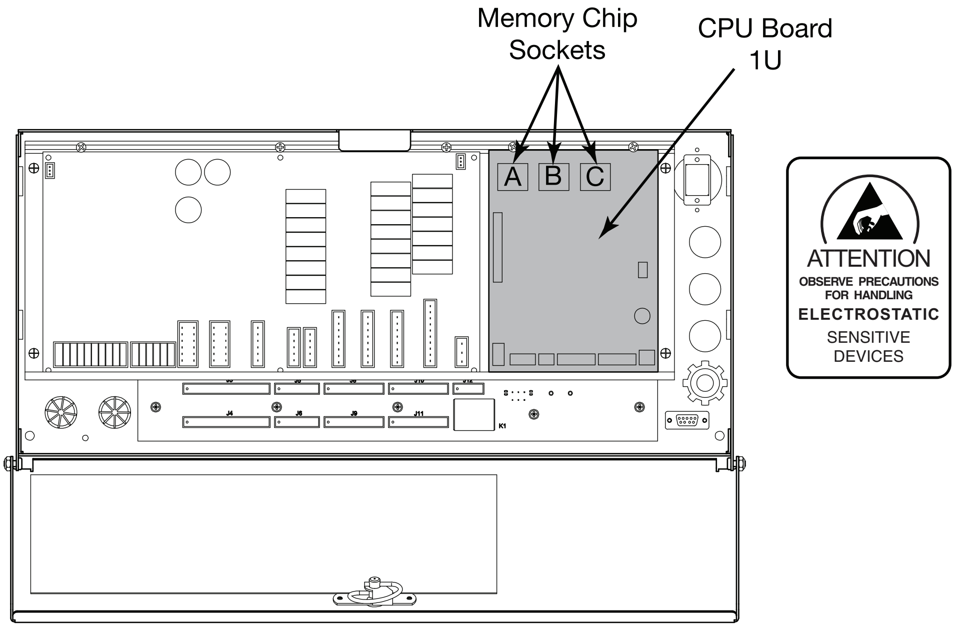
Always wear a grounding wrist strap when working in the Control Box or handling ESD-sensitive devices.

Keep ESD-sensitive components in their static-shielding bags until it is time to install them in the sterilizer.

To replace the CPU board:

1. Record the sterilizer configuration and customer settings as described in *"Replacing the Flash EPROM" on page 10–8*.
2. Remove power to the sterilizer by tripping the breaker on the cover of the power box.
3. Raise and latch the front panel.
4. Open the control box.

FIGURE 10–7. CPU BOARD LOCATION


Memory Chip Sockets
CPU Board 1U
A
B
C
J4
J8
J9
J11
K1
ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES

A07028-BK

5. Disconnect the cables attached to the CPU Board.

6. Remove the CPU Board.

7. Install the replacement CPU Board.

8. Reconnect the cables to the CPU Board.

9. Install the memory chips in sockets A, B, and C (or transfer the existing memory chips from the old board). See *"Replacing the Flash EPROM" on page 10–8*.
   a. Insert the chip with the Boolean code (identified by the SDN on the label) into socket A.
   b. Inserts the chips with the C language code (identified by PACS version on the label) into sockets B and C.

10. Close the control box.

11. Lower and close the front panel.

CM10 BOARD

Tools and Materials:

- Wrist strap, grounding

CAUTION

Observe handling precautions for devices sensitive to ESD (ElectroStatic Discharge) when working in the Control Box. Otherwise, damage to the equipment could result:

Always wear a grounding wrist strap when working in the Control Box or handling ESD-sensitive devices.

Keep ESD-sensitive components in their static-shielding bags until it is time to install them in the sterilizer.

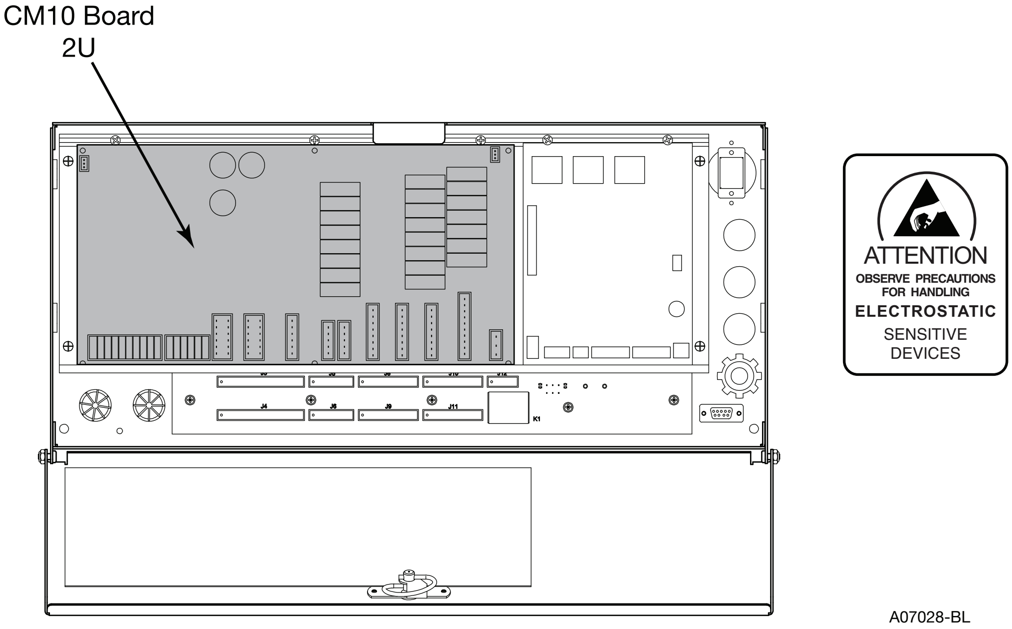
ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES
ESD

REPLACING CM10 BOARD 2A2U

To replace the CM10 board:

1. Remove power to the sterilizer by tripping the breaker on the cover of the power box.
2. Raise and latch the front panel.
3. Open the control box.

FIGURE 10–8. CM10 BOARD LOCATION


CM10 Board
2U
ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES
A07028-BL

4. Disconnect the cables attached to the CM10 board.
5. Remove the CM10 board.
6. Install the replacement CM10 board.

7. Reconnect the cables to the CM10 board
8. Verify the slide switches S1 thru S4 are configured as shown on *Figure 6–7, Sheet 2 on page 6–19*.
9. Close the control box.
10. Lower and close the front panel.

I/O BOARD

Tools and Materials:

- Wrist strap, grounding

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES
ESD

CAUTION

Observe handling precautions for devices sensitive to ESD (ElectroStatic Discharge) when working in the Control Box. Otherwise, damage to the equipment could result:

Always wear a grounding wrist strap when working in the Control Box or handling ESD-sensitive devices.

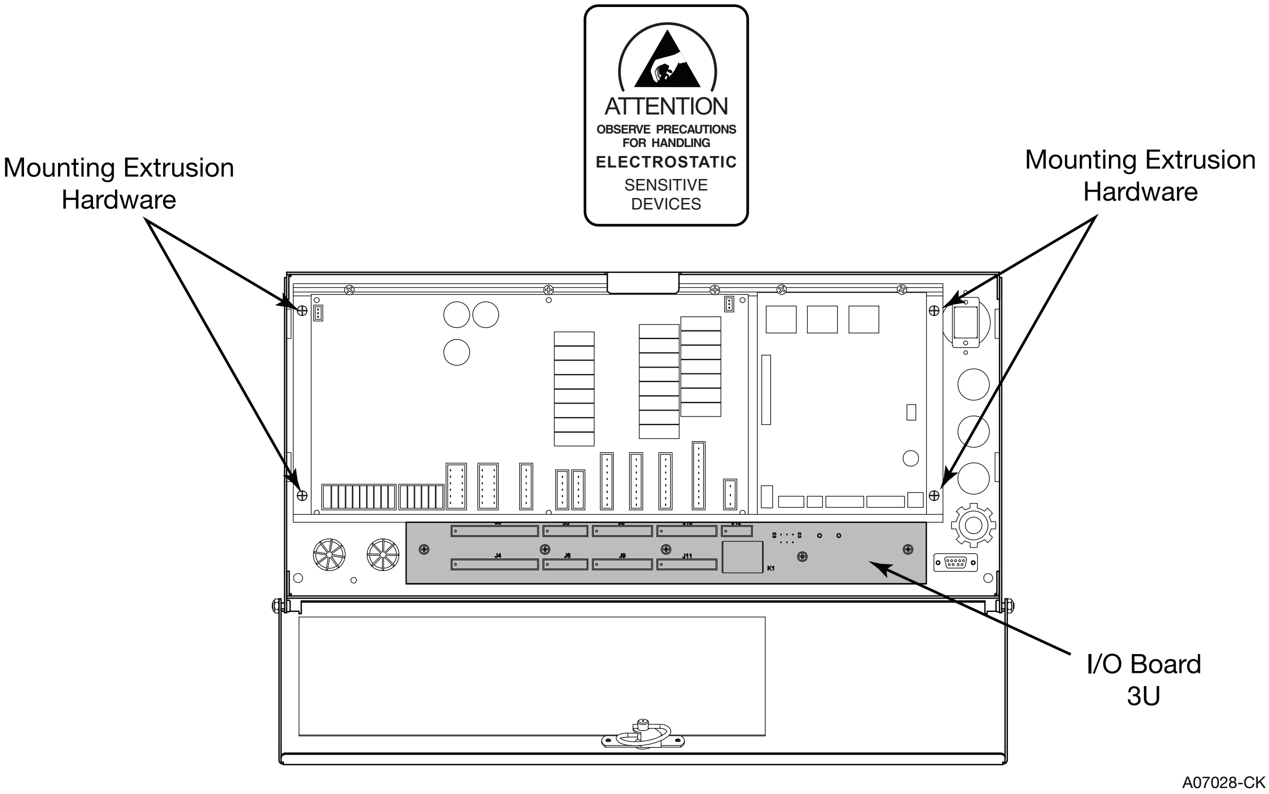
Keep ESD-sensitive components in their static-shielding bags until it is time to install them in the sterilizer.

REPLACING I/O BOARD 2A3U

To replace the I/O board:

1. Remove power to the sterilizer by tripping the breaker on the cover of the control box.
2. Raise and latch the front panel.
3. Open the control box.

FIGURE 10–9. I/O BOARD LOCATION

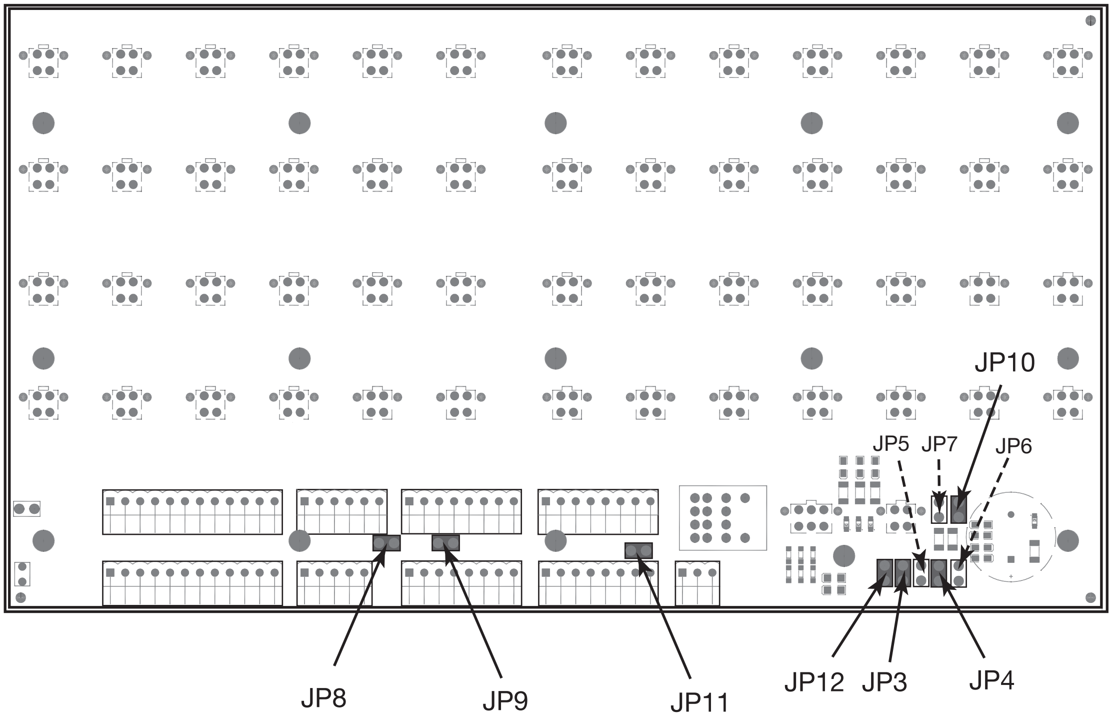

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC
SENSITIVE DEVICES
Mounting Extrusion Hardware
Mounting Extrusion Hardware
J4
J8
J9
J11
K1
I/O Board 3U
A07028-CK

4. Disconnect the cables that are plugged into the back of the control box.
5. Disconnect the cables that are attached to the CPU and CM10 boards.
6. Remove the CPU board, CM10 board and mounting extrusion as a unit.
7. Remove the I/O board.
8. Install the replacement I/O board.
9. Verify the jumpers on the I/O board (see Figure 10–10) are installed in the same locations as on the old board. Refer to *Figure 6–7, Sheet 2 on page 6–19*.

NOTE

If the sterilizer is a unidirectional double door unit, remove jumpers JP3 and JP4 and install jumpers JP5, JP6, and JP7.

FIGURE 10–10. I/O BOARD JUMPER LOCATIONS



10. Reinstall the CPU board, CM10 board, and extrusion.
11. Reconnect the cables to the CPU and CM10 boards.
12. Close the control box.
13. Lower and close the front panel.

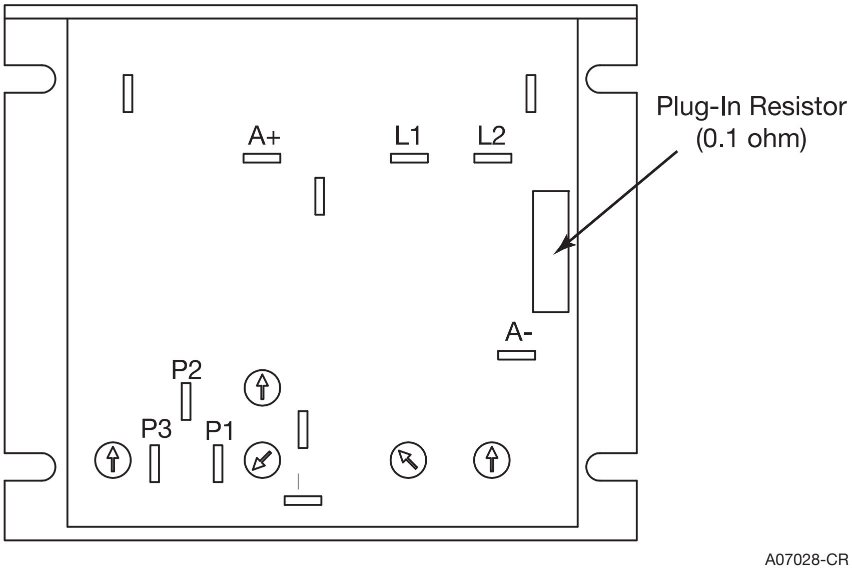
DOOR I/F BOX 15A/16A

REPLACING MOTOR CONTROLLER 1U

To replace the motor controller board:

1. Turn OFF power to the sterilizer by tripping the breaker on the cover of the power box.
2. Raise and latch the front panel.
3. Open the door I/F box

FIGURE 10–11. MOTOR CONTROLLER TERMINALS



4. Disconnect the wiring from the terminals on the motor controller board.
5. Remove the motor controller board.
6. Install the replacement motor controller board.
7. Transfer the 0.1 ohm plug-in resistor from the old board to the new board.
8. Verify the trimpots on the replacement motor controller are positioned as shown on *Figure 6–8, Sheet 1 on page 6–20*.
9. Connect the wiring to the terminals on the motor controller.
10. Close the door I/F box.
11. Lower and close the front panel.

REPLACING AMPLIFIER MODULE 2U

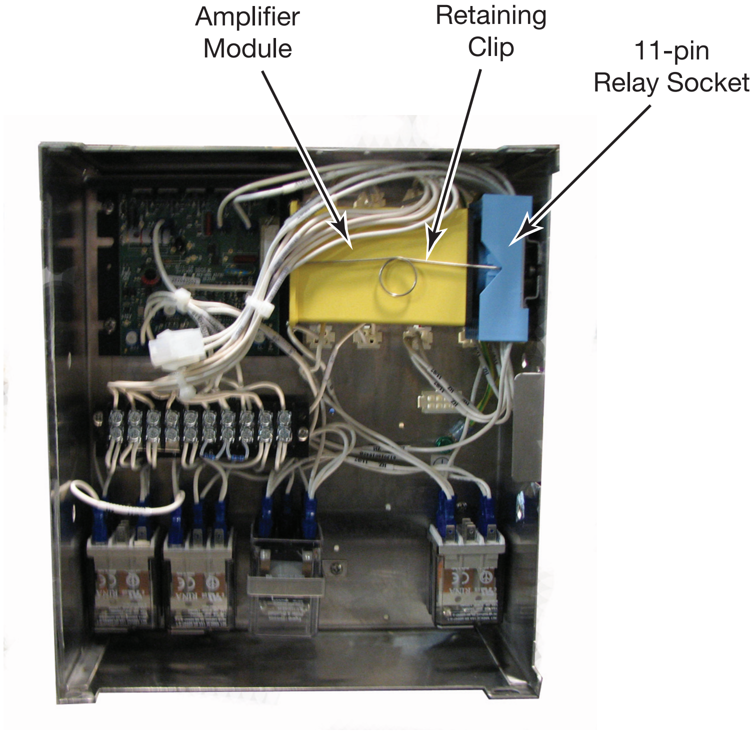
To replace the amplifier module:

1. Remove power to the sterilizer by tripping the breaker on the cover of the power box.

2. Raise and latch the front panel.

3. Open the door I/F box.

FIGURE 10–12. AMPLIFIER MODULE



Door I/F Box with Cover Removed

4. Release the clip that retains the amplifier module in its socket.

5. Remove the amplifier module from its relay socket.

6. Verify the DIP switches and gain adjustment on the new amplifier module are configured as shown on *Figure 6–8, Sheet 1 on page 6–20*.

7. Install the new amplifier module in the relay socket.

8. Secure the amplifier module with the retainer clip.

9. Close the door I/F box.

10. Lower and close the front panel.

PIPING SYSTEM COMPONENTS

SOLENOID VALVES

REBUILDING THE SOLENOID VALVES

To rebuild a solenoid valve:

1. Disassemble the solenoid valve and replace the parts with the parts in the rebuild package.

2. Follow the instructions included in the rebuild package.

CHECK VALVES

REBUILDING THE CHECK VALVES

To rebuild a check valve:

1. Disassemble the check valve and replace the parts with the parts in the spare parts package.

2. Follow the instructions included in the spare parts package.

STEAM BOILER

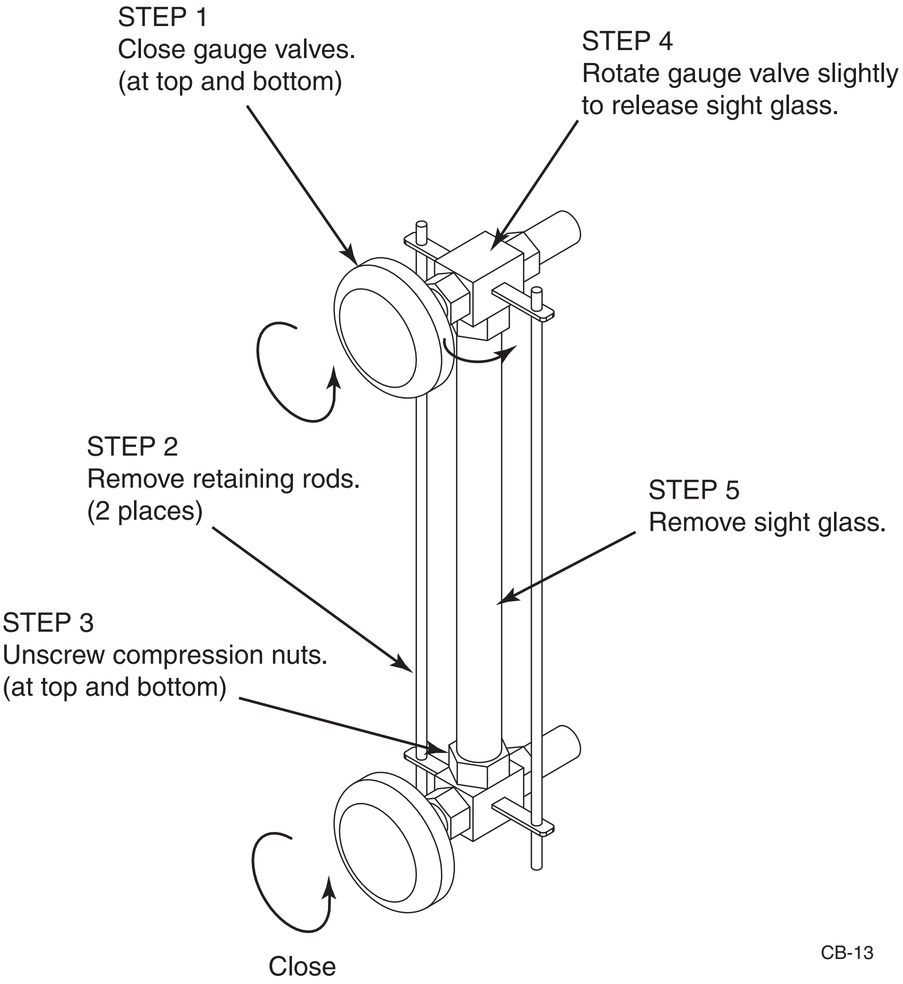
REMOVING THE SIGHT GLASS

The sight glass is protected by two retaining rods. It is secured to the top and bottom gauge valves by hex compression nuts.

To remove the sight glass:

1. Close the shutoff valves at the upper and lower ends of the gauge assembly.

FIGURE 10–13. SIGHT GLASS REMOVAL


STEP 1
Close gauge valves.
(at top and bottom)
STEP 4
Rotate gauge valve slightly
to release sight glass.
STEP 2
Remove retaining rods.
(2 places)
STEP 5
Remove sight glass.
STEP 3
Unscrew compression nuts.
(at top and bottom)
Close
CB-13

2. Remove the retaining rods.

3. Unscrew the compression nuts at the upper and lower ends of the sight glass.

CAUTION

Remove the sight glass very carefully. It will break easily.

---

4. Rotate the upper shutoff valve just enough to release the sight glass.

INSTALLING THE SIGHT GLASS

CAUTION
Always use new O-rings when installing a sight glass.

To install the replacement sight glass:

1. Place new O-rings on each end of the sight glass.
2. Reassemble the sight glass by reversing the removal procedure.
3. Open the shutoff valves.
4. Check for leaks when the unit is operating.

REMOVING THE HEATING ELEMENTS

WARNING
BURN HAZARD/SHOCK HAZARD: Before removing the heating elements, shut off all utility and electrical supply services to the boiler. Allow the unit to cool, then drain the water from the boiler. Close the manual drain valve after draining the water.

CAUTION
DO NOT use chemical solutions to clean or flush the boiler.

To remove the heating elements:

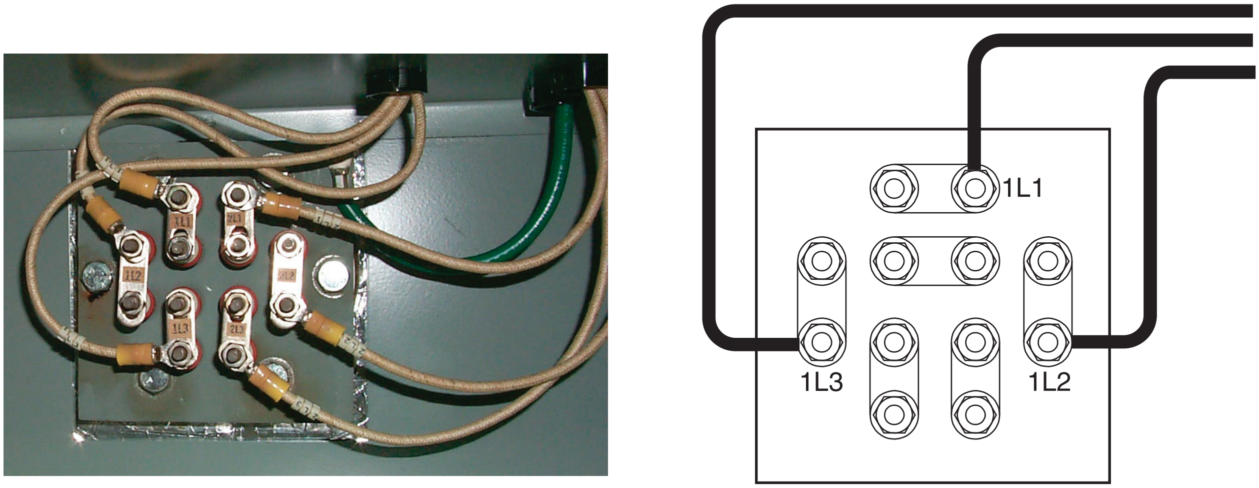
1. Turn OFF the three-phase power to the boiler at the mains disconnect. Lock out/tag out the mains disconnect switch.
2. Turn OFF the boiler power switch.
3. Turn OFF the hot water supply to the boiler.
4. Remove the cover from the boiler electrical cabinet.

CAUTION
If the mounting plate of the heating element assembly does not have TOP stamped on the upper edge, mark it for reassembly in the same location. Heating elements will burn out if not re-assembled to the original position.

---

5. Mark, then disconnect the wires, including the ground wire from the terminals on the mounting plate.

FIGURE 10–14. HEATING ELEMENT WIRING



208VAC – 240VAC

415VAC – 480VAC

6. Remove the bolts that secure the mounting plate.
7. Withdraw the heating element assembly by pulling it slightly forward and lifting it upward until it clears the boiler opening.

INSTALLING THE HEATING ELEMENTS

CAUTION

Always use a new gasket when reassembling the heating element assembly.

When replacing a heating element assembly, always check that the heating elements are assembled to the same location on the new assembly, relative to the TOP of the mounting plate.

To install the replacement heating elements:

1. Apply anti-seize pipe compound to the mating surfaces of the mounting plate, boiler flange and both surfaces of the new gasket.
2. Apply anti-seize compound to the mounting plate bolts and assemble the heating element assembly to the boiler.

NOTE

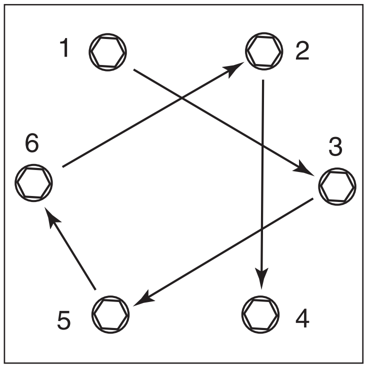
Be sure the edge of the mounting plate marked TOP is the highest edge.

Use only new element flange bolts.

---

3. Reinstall the heating element in the boiler chamber, using a new heating element gasket.

FIGURE 10–15. FLANGE BOLT TIGHTENING SEQUENCE



(heating elements not shown for clarity)

A07028-DK

4. Tighten the flange bolts in the order shown.
5. Torque the element flange bolts to 20 lb-in.
6. Connect all electrical wires to their respective terminals:
   a. Torque the element terminals to 20 lb-in.
   b. Torque the contactor terminals to 45 lb-in.
7. Check that the manual drain valve is closed.
8. Open the ball valve in the water supply line.
9. Turn ON the electrical supply to the boiler.
10. Turn ON the boiler power switch.
11. As the boiler fills the water, check for leaks. If leaking occurs, turn OFF the electrical supply to the boiler and retighten the bolts.
12. Check again for leaks as the boiler reaches operating pressure and periodically thereafter.

WARNING

BURN HAZARD/SHOCK HAZARD: The torque should be checked when the unit is cold and with the power disconnected at the source.

13. After the boiler has been operating for several hours at working pressure, check the torque of the heating element bolts.

BOOSTER PUMP

REPAIR PARTS

Refer to the manufacturer’s instruction manual for booster pump repair procedures. The following repair parts are available:

- Seal package with instructions—PN 513392
- Repair Kit, Pump Seal Package—PN 513390
- Pump Casing Gasket—PN 513391

DOOR COMPONENTS

BEFORE YOU BEGIN

Tools and Materials:

- spanner wrench (provided)
- (2) 3/8-16 x 2” hex-head cap screws (PN E4864)

NOTE

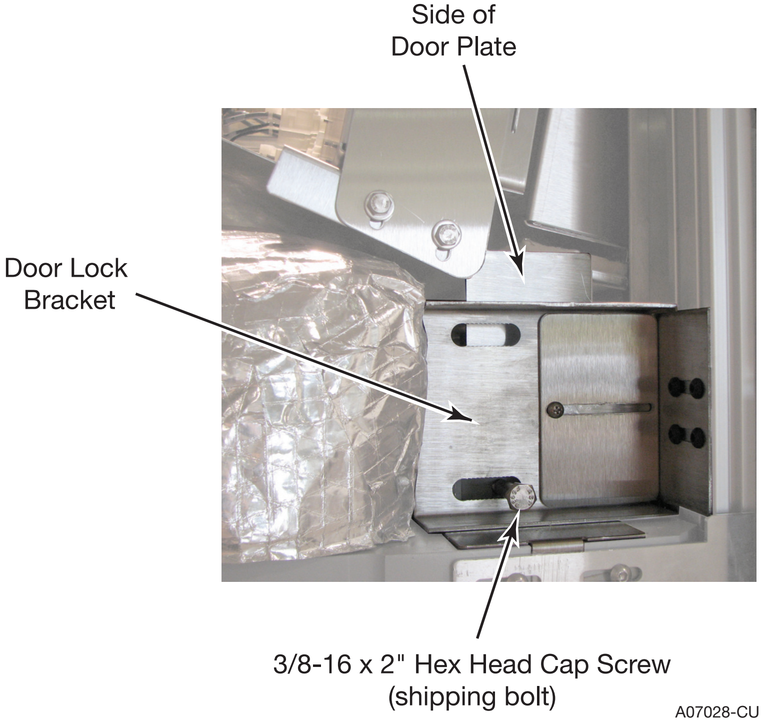
HELPFUL HINT: The cap screws used to secure the door are the ones that were used to retain the door during shipping. After the repairs are finished, tape the screws to the door lock bracket, so they will be available for future repairs. Keep an extra pair of cap screws in your tool box in case the screws were discarded after installation.

SECURING THE DOOR

To secure the door:

1. Raise the door to its closed position.

FIGURE 10–16. SECURING THE DOOR



NOTE

Two 3/8-16 x 2” hex head cap screws (shipping bolts) were used to secure the door during shipping and were removed during installation of the sterilizer.

---

2. Using the 3/8 -16 x 2” hex head cap screws, secure the door on both sides as shown in Figure 10–16.

TIMING BELT

REPLACING THE TIMING BELT

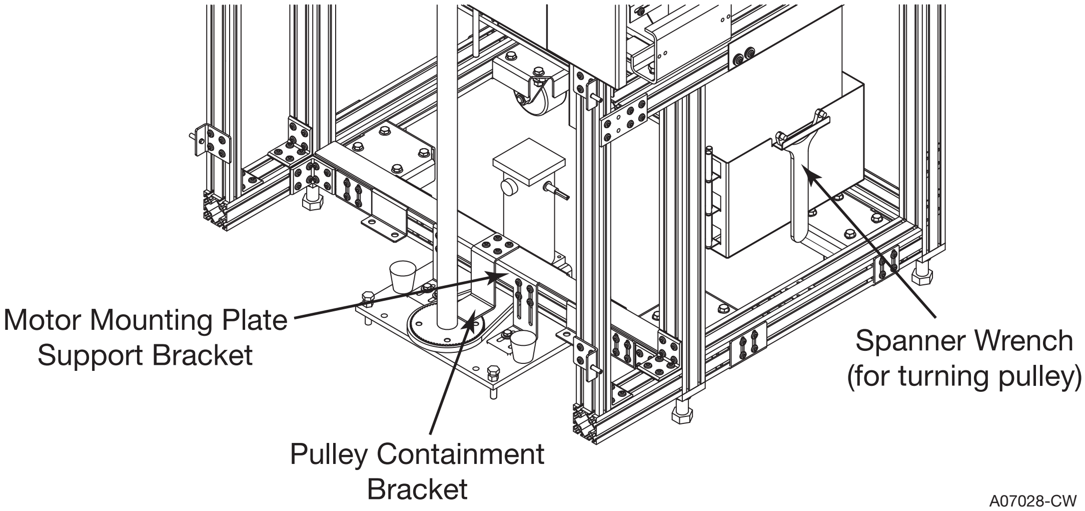
WARNING

POSSIBILITY OF INJURY: Secure the door by bolting it on both sides (see Figure 10–16 on page 10–31). When the lift screw is retracted into the door, the door motor mounting plate no longer bears the weight of the door.

To replace the timing belt:

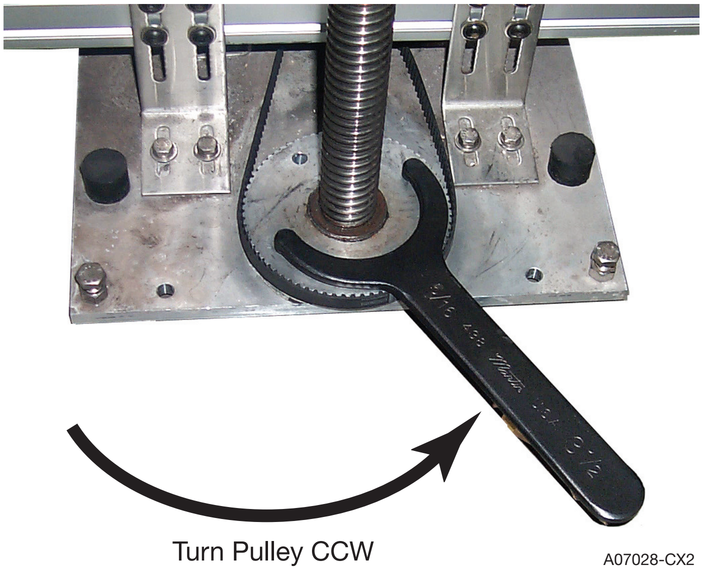
1. Close the door and secure it as described in *“Securing the Door” on page 10–31*.

FIGURE 10–17. PULLEY CONTAINMENT BRACKET


Motor Mounting Plate
Support Bracket
Spanner Wrench
(for turning pulley)
Pulley Containment
Bracket
A07028-CW

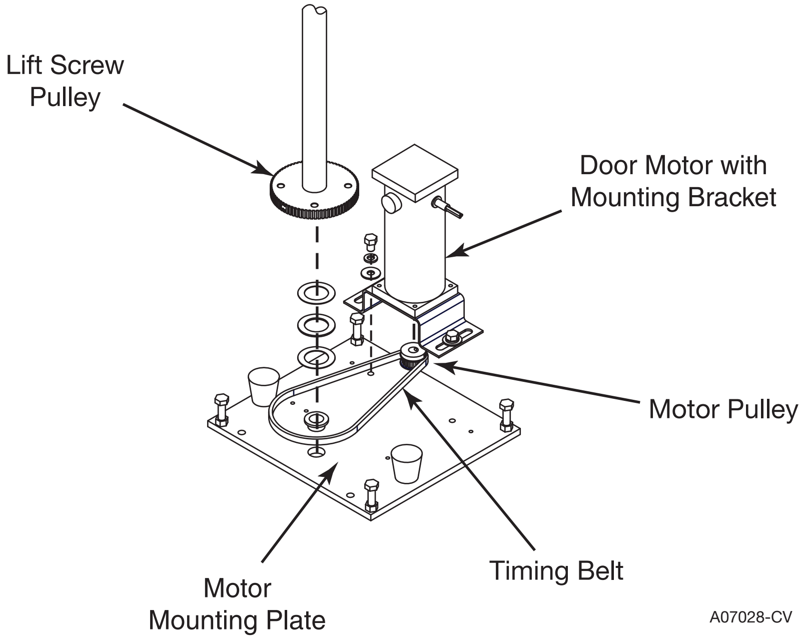
2. Remove the pulley containment bracket from the motor mounting plate support bracket.

FIGURE 10–18. TURNING THE PULLEY MANUALLY


Turn Pulley CCW
A07028-CX2

3. Using the spanner wrench, turn the pulley counter-clockwise to retract the lift screw into the door.

FIGURE 10–19. REMOVING THE TIMING BELT


Lift Screw Pulley
Door Motor with Mounting Bracket
Motor Pulley
Timing Belt
Motor Mounting Plate
A07028-CV

4. Lift the belt off of the lift screw pulley.

5. Loosen the hardware that secure the door motor mounting bracket to the motor mounting plate.

6. Lift the door motor/mounting bracket assembly enough to free the timing belt from the motor pulley.

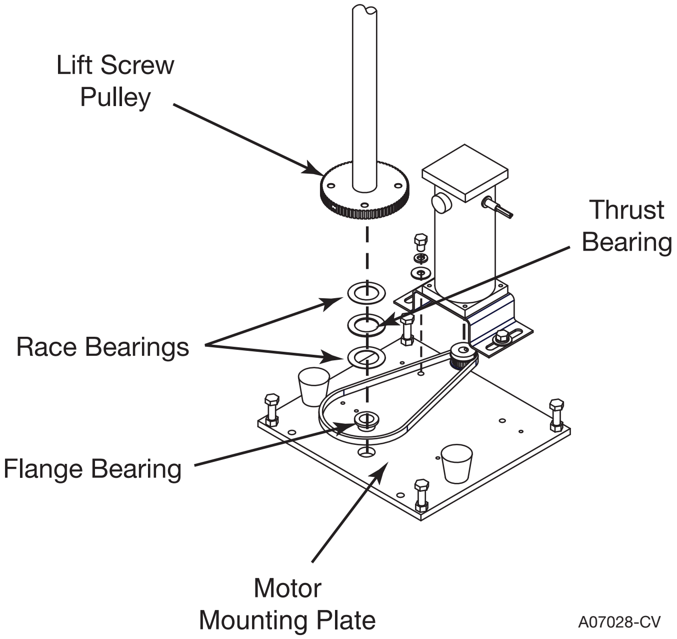
7. Remove the timing belt.

8. Place the new timing belt on the lift screw pulley.

CAUTION

Before lowering the lift screw, be sure the race bearings, thrust bearing, and flange bearing are installed between the lift screw pulley and motor mounting plate as shown in Figure 10–20 on page 10–34.

FIGURE 10–20. PULLEY BEARINGS



9. Using the spanner wrench, extend the lift screw out from the door by turning the lift screw pulley counterclockwise.

10. Wrap the timing belt around the lift screw pulley.

11. Lift up the door motor/mounting bracket assembly enough to wrap the timing belt around the motor pulley.

12. Adjust the door motor mounting bracket as needed to tension the timing belt.

13. Tighten the mounting bracket hardware.

14. Reinstall the pulley containment bracket.

15. Remove the hex head cap screws that secure the door.

PULLEY WHEEL BEARINGS

REPLACING THE PULLEY BEARINGS

CAUTION

When replacing the pulley bearings, note the stacking order shown in Figure 10–20

The pulley bearings should be replaced every 12,500 cycles or 5 years.

To replace the pulley bearings:

1. To gain access to the pulley bearings, see *“Replacing the Timing Belt” on page 10–32*.

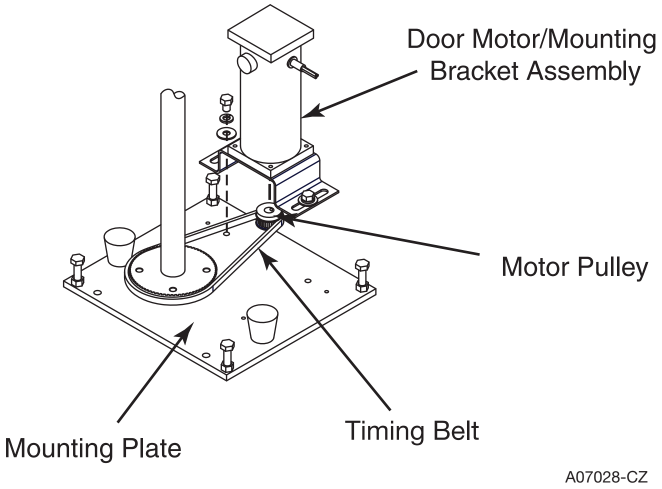
DOOR MOTOR

REPLACING THE DOOR MOTOR

To replace the door motor:

1. Raise the door to the closed position.
2. Disconnect the motor cable from 2J on the door I/F box.

FIGURE 10–21. REMOVING THE DOOR MOTOR



3. Remove the hardware that secures the door motor/mounting bracket assembly to the motor mounting plate.
4. Remove the timing belt from around the motor pulley.
5. Remove the door motor/mounting bracket assembly from the motor mounting plate.
6. Remove the hardware that secures the door motor to the mounting bracket.
7. Loosen the set screws that secure the motor pulley to the motor shaft.
8. Install the replacement motor on the mounting bracket.
9. Install the motor pulley on the motor shaft.
10. Position the motor/mounting bracket on the motor mounting plate.
11. Slip the timing belt around the motor pulley.
12. Adjust the door motor mounting bracket as needed to tension the timing belt.
13. Tighten the mounting bracket hardware.
14. Connect the motor cable to 2J on the door I/F box.

DOOR SPACER

REPLACING THE DOOR SPACER

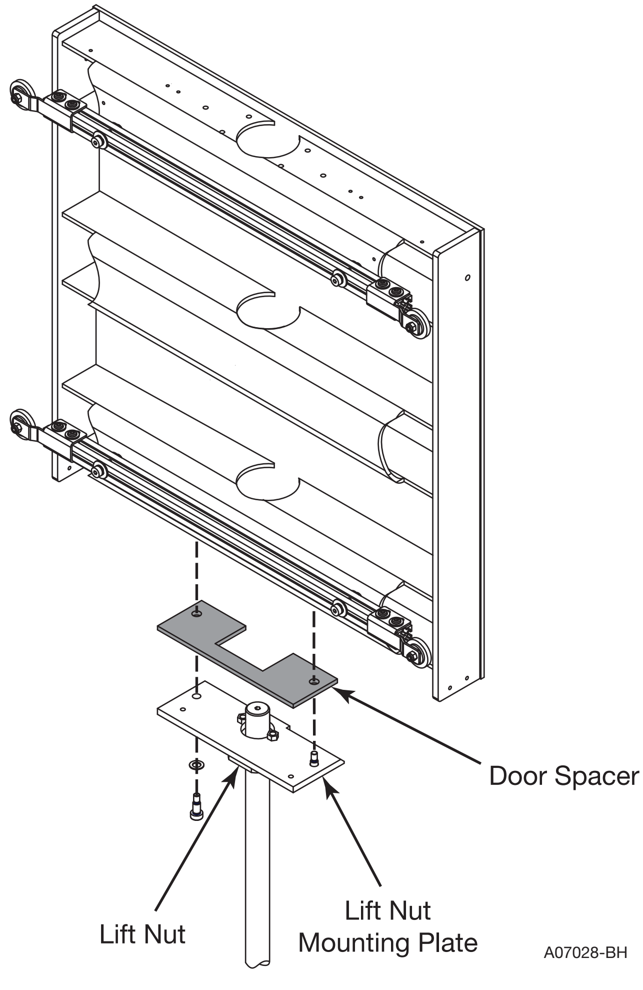
WARNING

POSSIBILITY OF INJURY: Secure the door by bolting it on both sides (see Figure 10–16 on page 10–31). When the lift nut mounting plate is detached from the bottom of the door plate, the door motor mounting plate no longer bears the weight of the door.

To replace the door spacer:

1. Remove the door cover (see *“Door Cover Removal” on page 4–5*).
2. Close the door and secure it as described in *“Securing the Door” on page 10–31*.

FIGURE 10–22. DOOR SPACER



3. Remove the mounting hardware that secures the lift nut mounting plate to the bottom of the door plate.
4. Turn the lift nut mounting plate clockwise on the lift screw until the door spacer can be removed from the mounting plate.

5. Install the replacement door spacer on the lift nut mounting plate. Orient the spacer so that the notch is facing towards the chamber. Line up the holes in the door spacer with the holes in the lift nut mounting plate.

6. Turn the door spacer/lift nut mounting plate clockwise until the spacer touches the bottom of the door plate.

7. Secure the lift nut mounting plate to the bottom of the door plate.

8. Reinstall the door cover.

9. Remove the hex head cap screws that secure the door.

LIFT SCREW AND NUT

REPLACING THE LIFT SCREW AND NUT

To replace the lift screw and nut:

1. Follow steps 1 thru 4 of *“Replacing the Door Spacer” on page 10–36*.

2. Once the lift nut mounting plate is detached from the bottom of the door plate and the timing belt is slipped off the pulley, the lift screw/lift nut assembly can be removed from the door by lifting and tilting it.

GUIDE ROLLERS AND SPRING TENSION ASSEMBLY

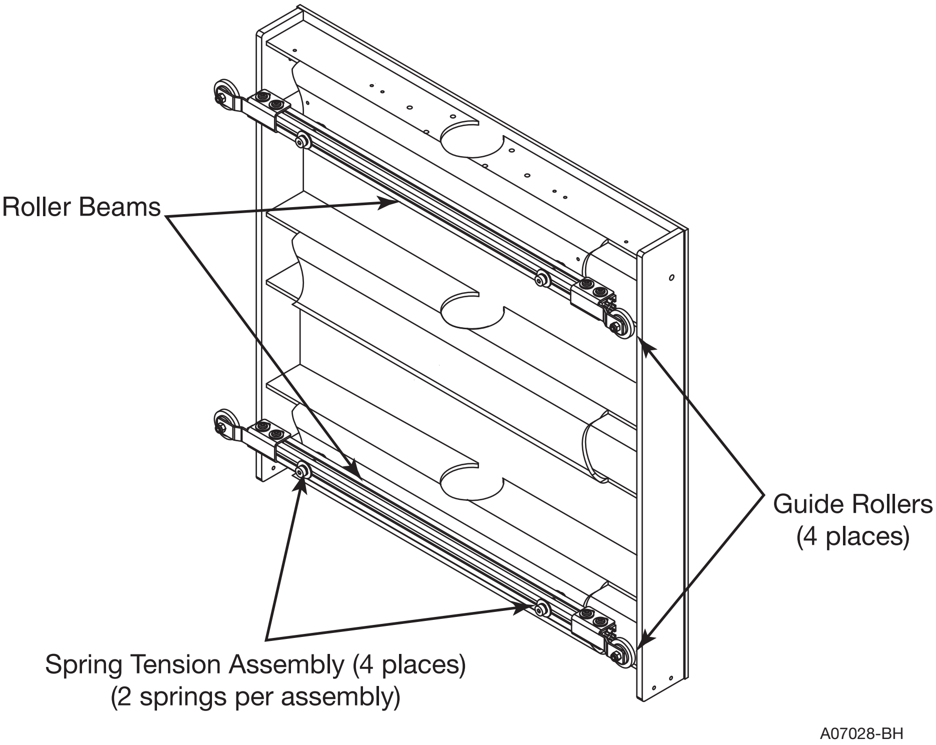
Refer to Figure 10–23. The guide rollers prevent the door plate from moving laterally when the door is raised or lowered. The guide rollers exert outward pressure against the upright extrusion to ensure that the door moves smoothly.

The spring tension assembly apply counter-pressure against the pressurized gasket to help maintain a tight seal.

Tools and Materials:

- torque wrench/driver

FIGURE 10–23. GUIDE ROLLERS AND TENSION SPRINGS


Roller Beams
Guide Rollers
(4 places)
Spring Tension Assembly (4 places)
(2 springs per assembly)
A07028-BH

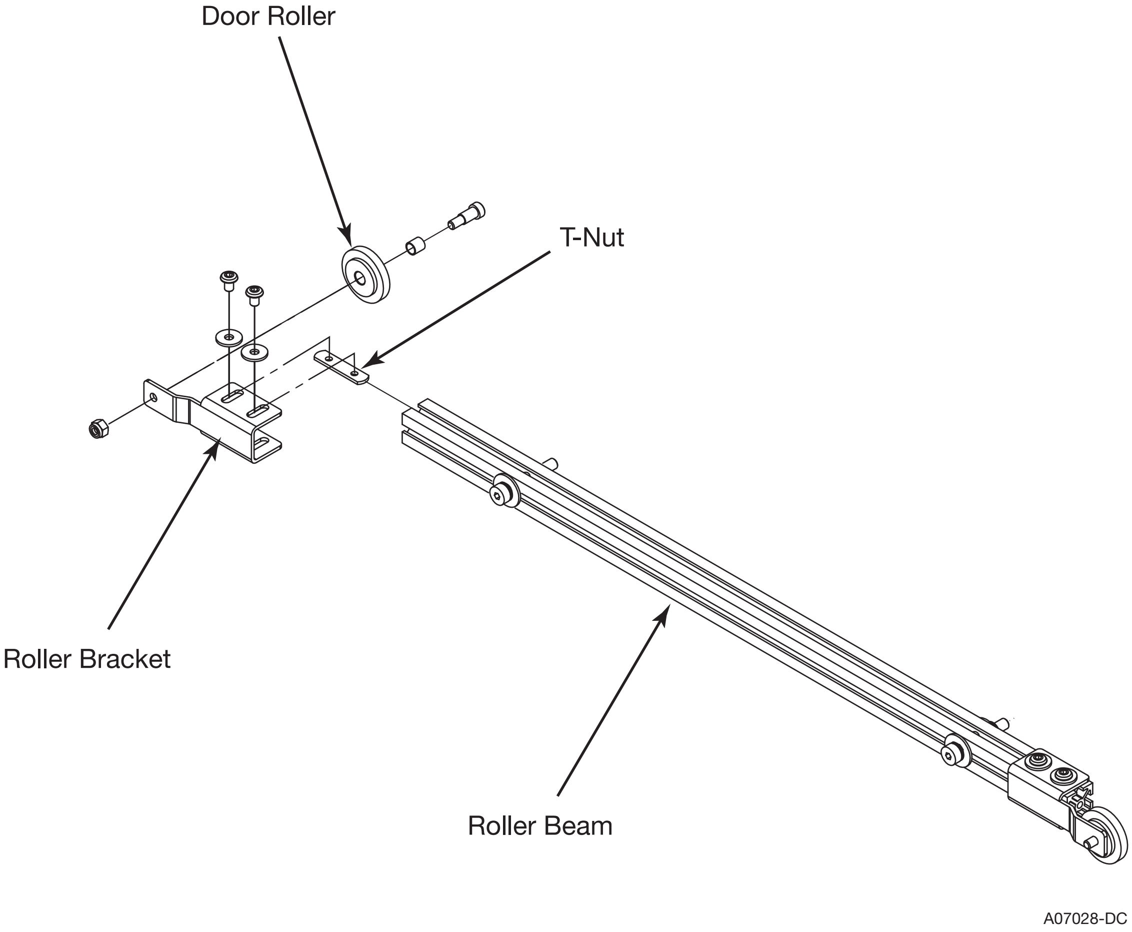
REPLACING THE GUIDE ROLLERS

CAUTION
Do not remove more than one door roller at a time. If more than one roller is removed, the door will need to be realigned after the rollers are replaced.

To replace a guide roller:

1. Remove the door cover (see *“Door Cover Removal” on page 4–5*).
2. Close the door and secure it as described in *“Securing the Door” on page 10–31*.

FIGURE 10–24. GUIDE ROLLER ASSEMBLY



3. Remove the hardware that secures the roller bracket to the T-nut inside the extrusion groove.
4. Remove the hardware that secures the roller to the bracket.
5. Remove the roller.
6. Secure the replacement roller to the roller bracket.

CAUTION

Do not overtighten the screws that secure the roller bracket to the roller beam. Tightening the hardware to more than 15 ft-lbs may warp the extrusion.

---

7. Reinstall the roller bracket on the roller beam. Tighten the hardware to 10 ft-lbs.
8. Reinstall the door cover.
9. Remove the hex head cap screws that secure the door.

REPLACING THE TENSION SPRINGS

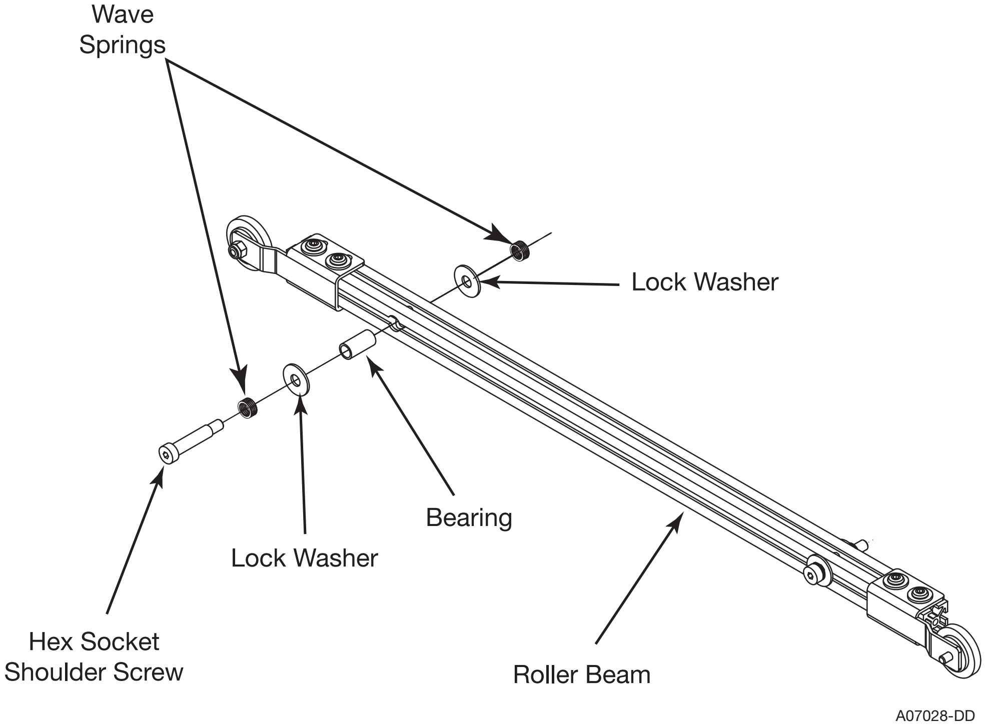
CAUTION

Do not remove more than one set of springs at a time. If more than one set of springs is removed, the door will need to be realigned after the springs are replaced.

To replace the tension springs:

1. Remove the door cover (see *“Door Cover Removal” on page 4–5*).
2. Close the door and secure it as described in *“Securing the Door” on page 10–31*.

FIGURE 10–25. TENSION SPRING ASSEMBLY


Wave Springs
Lock Washer
Bearing
Lock Washer
Hex Socket Shoulder Screw
Roller Beam
A07028-DD

NOTE

The wave spring and lock washer between the roller beam and the door plate will drop when the shoulder screw is removed. The bearing should remain in the roller beam extrusion.

3. Remove the hex socket shoulder screw that secures the roller beam to the door plate.
4. Install the replacement wave springs in the order shown in Figure 10–25.
5. Tighten the shoulder screw to 15 to 20 ft-lbs.

APPENDIX A WORKSHEETS

INTRODUCTION

This sections contains worksheets that may be used to record cycle information. Copy these pages as necessary.

CYCLE ASSIGNMENTS

MODEL 633HC

The 633HC sterilizer is shipped with 21 pre-programmed cycles:

- (9) Prevacuum
- (6) Gravity
- (2) Flash 3+
- (2) Flash 10+
- (1) Liquids
- (1) Vacuum Leak Test

The cycles may be renamed and renumbered by the customer. Use the cycle assignment worksheet (Figure A–1) to record the cycle names and sequence.

FIGURE A–1. 633HC CYCLE ASSIGNMENTS WORKSHEET

Cycle No.	Cycle Type (circle one)	Cycle Name (8 characters max.)	Comments
P1	vac grv f3 f10 liq lk		
P2	vac grv f3 f10 liq lk		
P3	vac grv f3 f10 liq lk		
P4	vac grv f3 f10 liq lk		
P5	vac grv f3 f10 liq lk		
P6	vac grv f3 f10 liq lk		
P7	vac grv f3 f10 liq lk		
P8	vac grv f3 f10 liq lk		
P9	vac grv f3 f10 liq lk		
P10	vac grv f3 f10 liq lk		
P11	vac grv f3 f10 liq lk		
P12	vac grv f3 f10 liq lk		
P13	vac grv f3 f10 liq lk		
P14	vac grv f3 f10 liq lk		
P15	vac grv f3 f10 liq lk		
P16	vac grv f3 f10 liq lk		
P17	vac grv f3 f10 liq lk		
P18	vac grv f3 f10 liq lk		
P19	vac grv f3 f10 liq lk		
P20	vac grv f3 f10 liq lk		
P21	vac grv f3 f10 liq lk		

Cycle Type codes:
vac = prevacuum
grv = gravity
f3 = flash 3+
f10 = flash 10+
liq = liquids
lk = leak test

A07028-AE

MODEL 633LS

The 633LS sterilizer is shipped with 19 pre-programmed cycles:

- (6) Prevacuum
- (6) Gravity
- (6) Liquids
- (1) Vacuum Leak Test

The cycles may be renamed and renumbered by the customer. Use the cycle assignment worksheet (Figure A–2) to record the cycle names and sequence.

FIGURE A–2. 633LS CYCLE ASSIGNMENTS WORKSHEET

Cycle No.	Cycle Type (circle one)	Cycle Name (8 characters max.)	Comments
P1	vac grv liq lk		
P2	vac grv liq lk		
P3	vac grv liq lk		
P4	vac grv liq lk		
P5	vac grv liq lk		
P6	vac grv liq lk		
P7	vac grv liq lk		
P8	vac grv liq lk		
P9	vac grv liq lk		
P10	vac grv liq lk		
P11	vac grv liq lk		
P12	vac grv liq lk		
P13	vac grv liq lk		
P14	vac grv liq lk		
P15	vac grv liq lk		
P16	vac grv liq lk		
P17	vac grv liq lk		
P18	vac grv liq lk		
P19			Not Assigned
P20			Not Assigned
P21	vac grv liq lk		

Cycle Type codes: vac = prevacuum grv = gravity liq = liquids
lk = leak test

A07028-AE2

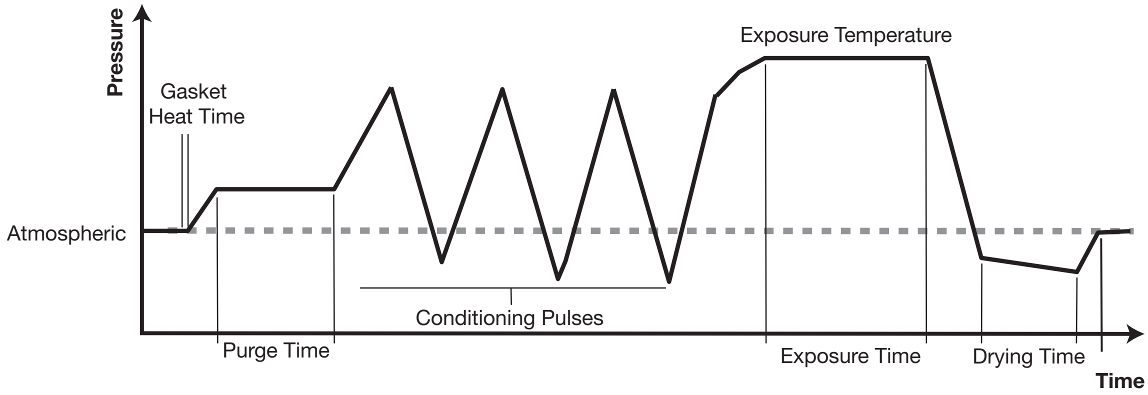
CYCLE PARAMETERS

MODEL 633HC

Cycle parameters are located on two display screens: Edit Parameters (accessed by pressing the [PARAMETERS] softkey) and Extended Parameters (accessed by selecting EXTENDED PARAMETERS from the CONFIGURATION menu).

The cycle worksheets (Figure A–3 thru Figure A–7) list the allowable range and resolution (smallest adjustable increment) of each parameter. The worksheets also include the factory settings for the cycle.

FIGURE A–3. 633HC PREVACUUM CYCLE WORKSHEET



Cycle No. P Cycle Name vac

EDIT PARAMETERS Screen

				Factory Settings		
		Range	Resolution	Prevac 1	Prevac 2	B & D Test
Exposure Time		00:01:00 to 06:00:00	1 sec.	00:03:00	00:03:00	00:03:30
Drying Time		00:00:15 to 12:00:00	1 sec.	00:16:00	00:03:00	00:00:00
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00	00:00:00	00:00:00
Exposure Temp.		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	135.0°C (275.0°F)	135.0°C (275.0°F)	133.9°C (273.0°F)

EXTENDED PARAMETERS Screen

				Factory Settings		
		Range	Resolution	Gravity 1	Gravity 2	B & D Test
Purge Time		00:02:30 to 00:10:00	1 sec.	00:02:30	00:02:30	00:02:30
	26” length:	00:01:30 to 00:10:00	1 sec.	00:01:30	00:01:30	00:01:30
Conditioning Pul		00003 to 00010	1	00003	00003	00003
Gasket Heat Time (see Note 2)		00:00:05 to 00:03:00	1 sec.	00:00:10	00:00:10	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	50.0°C (122.0°F)	50.0°C (122.0°F)	50.0°C (122.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0 °C (1.8 to 36.0 °F)	0.1°	5.0°C (9.0°F)	5.0°C (9.0°F)	5.0°C (9.0°F)

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.

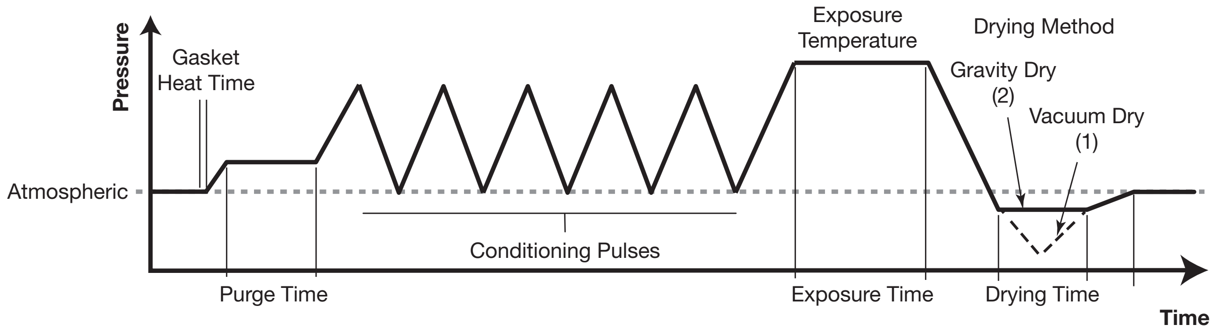
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.

3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633HC PREVAC

A07028-K

FIGURE A–4. 633HC GRAVITY CYCLE WORKSHEET


Pressure
Gasket Heat Time
Atmospheric
Conditioning Pulses
Purge Time
Exposure Temperature
Drying Method
Gravity Dry (2)
Vacuum Dry (1)
Exposure Time
Drying Time
Time

Cycle No. P

Cycle Name grv

EDIT PARAMETERS Screen

				Factory Settings	
		Range	Resolution	Gravity 1	Gravity 2
Exposure Time		00:01:00 to 06:00:00	1 sec.	00:30:00	00:10:00
Dry 1=vac 2=grav		00001 or 00002	—	00002	00002
Drying Time		00:00:15 to 12:00:00	1 sec.	00:30:00	00:30:00
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00	00:00:00
Exposure Temp.		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	121.1°C (250.0°F)	135.0°C (275.0°F)

EXTENDED PARAMETERS Screen

				Factory Settings	
		Range	Resolution	Gravity 1	Gravity 2
Purge Time		00:02:30 to 00:10:00	1 sec.	00:02:30	00:02:30
Conditioning Pul		00005 to 00010	1	00005	00005
Gasket Heat Time (see Note 2)		00:00:05 to 00:03:00	1 sec.	00:00:10	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	50.0°C (122.0°F)	50.0°C (122.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0 °C (1.8 to 36.0 °F)	0.1°	5.0°C (9.0°F)	5.0°C (9.0°F)

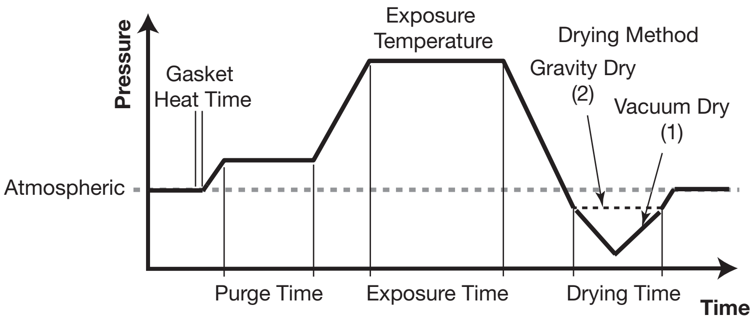
☞

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.
3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

63HC GRAVITY

A07028-J

FIGURE A–5. 633HC FLASH 3+ CYCLE WORKSHEET



Cycle No. P

Cycle Name f 3

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings Flash 3+
Exposure Time		00:03:00 to 06:00:00	1 sec.	00:03:00
Dry 1=vac 2=grav		00001 or 00002	—	00001
Drying Time		00:00:15 to 12:00:00	1 sec.	00:00:30
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00
Exposure Temp.		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	121.1°C (250.0°F)

EXTENDED PARAMETERS Screen

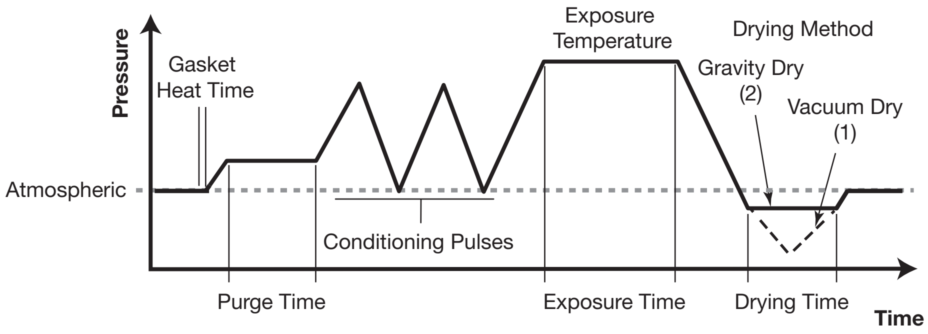
		Range	Resolution	Factory Settings Flash 3+
Purge Time		00:02:30 to 00:10:00	1 sec.	00:02:30
Gasket Heat Time (see Note 2)		00:00:05 to 00:03:00	1 sec.	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	50.0°C (122.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0 °C (1.8 to 36.0 °F)	0.1°	5.0°C (9.0°F)

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.
3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633HC FLASH 3+

A07028-L

FIGURE A–6. 633HC FLASH 10+ CYCLE WORKSHEET


Pressure
Gasket Heat Time
Exposure Temperature
Drying Method
Gravity Dry (2)
Vacuum Dry (1)
Atmospheric
Conditioning Pulses
Purge Time
Exposure Time
Drying Time
Time

Cycle No. P

Cycle Name f10

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings Flash 10+
Exposure Time		00:10:00 to 06:00:00	1 sec.	00:10:00
Dry 1=vac 2=grav		00001 or 00002	—	00001
Drying Time		00:00:15 to 12:00:00	1 sec.	00:00:30
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00
Exposure Temp.		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	135.0°C (275.0°F)

EXTENDED PARAMETERS Screen

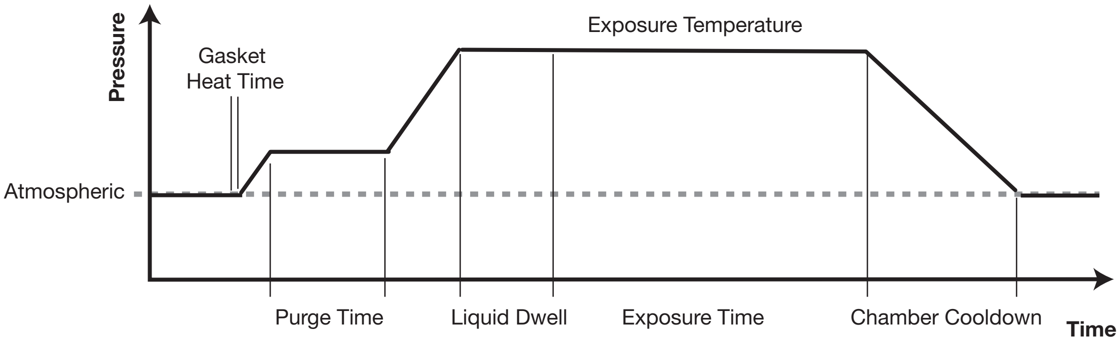
		Range	Resolution	Factory Settings Flash 10+
Purge Time		00:02:30 to 00:10:00	1 sec.	00:02:30
Conditioning Pul		00002 to 00010	1	00002
Gasket Heat Time (see Note 2)		00:00:05 to 00:03:00	1 sec.	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	50.0°C (122.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0 °C (1.8 to 36.0 °F)	0.1°	5.0°C (9.0°F)

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.
3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633HC FLASH 10+

A07028-M

FIGURE A–7. 633HC LIQUIDS CYCLE WORKSHEET



Cycle No. P Cycle Name liq

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings Liquids 1
Exposure Temp.		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	121.1°C (250.0°F)
Liquid Dwell		00:00:00 to 00:30:00	1 sec.	00:08:00
Exposure Time		00:01:00 to 06:00:00	1 sec.	00:45:00
Chamber Cooldown		0.00 to 5.00 psi/min	0.01	0.75
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00

EXTENDED PARAMETERS Screen

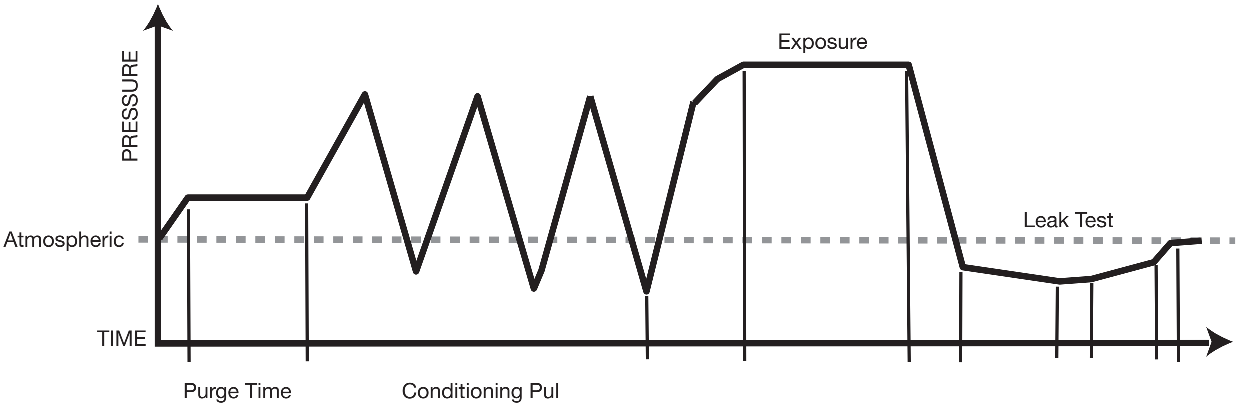
		Range	Resolution	Factory Settings Liquids 1
Purge Time		00:02:30 to 00:10:00	1 sec.	00:02:30
Gasket Heat Time (see Note 2)		00:00:05 to 00:03:00	1 sec.	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	50.0°C (122.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0 °C (1.8 to 36.0 °F)	0.1°	5.0°C (9.0°F)

☞

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.
3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633HC LIQUIDS A07028-N

FIGURE A–8. 633HC VACUUM LEAK TEST CYCLE WORKSHEET



Cycle No. P Cycle Name lkt

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00

EXTENDED PARAMETERS Screen

		Range	Resolution	Factory Settings
Purge Time 26"		00:01:30 to 00:10:00	1 sec.	00:01:30
Purge Time 39"/51"		00:02:30 to 00:10:00	1 sec.	00:02:30
Conditioning Pul		3 to 10	1	3
Start Drain Cool (see Note 2)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	50.0°C (122.0°F)
Drain Cool Diff (see Note 2)		1.0 to 20.0 °C (1.8 to 36.0 °F)	0.1°	5.0°C (9.0°F)

☞ 1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.

2. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

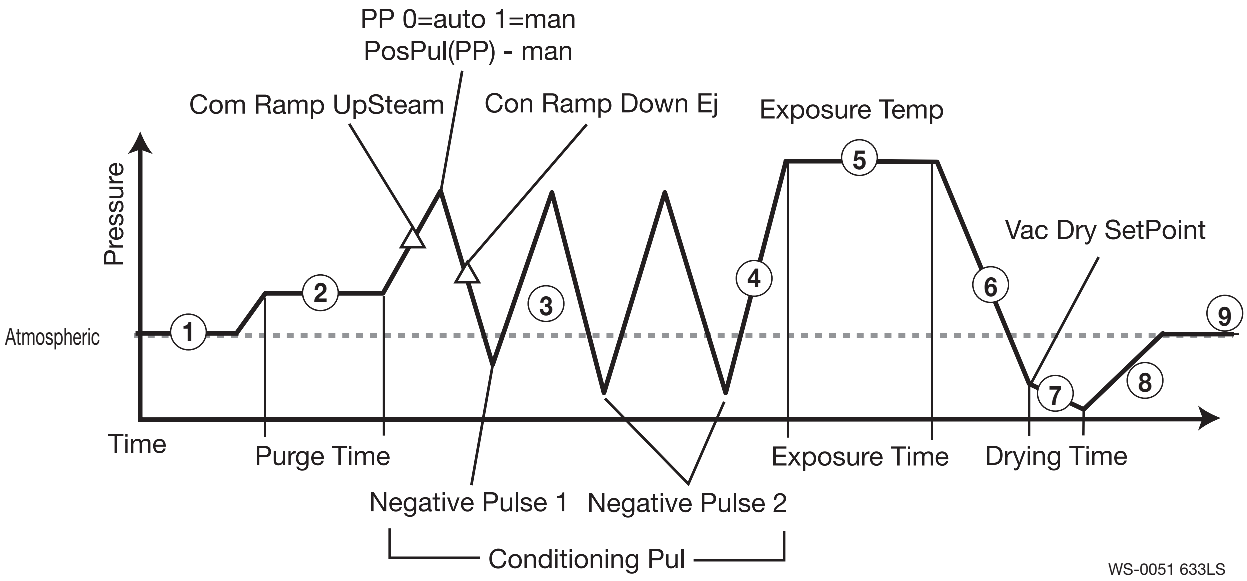
633HC LEAK TEST A07028-DR

MODEL 633LS

Cycle parameters are located on two display screens: Edit Parameters (accessed by pressing the [PARAMETERS] softkey) and Extended Parameters (accessed by selecting EXTENDED PARAMETERS from the CONFIGURATION menu).

The cycle worksheets (Figure A–9 thru Figure A–12) list the allowable range and resolution (smallest adjustable increment) of each parameter. The worksheets also include the factory settings for the cycle.

FIGURE A–9, SHEET 1. 633LS PREVACUUM CYCLE WORKSHEET


PP 0=auto 1=man
PosPul(PP) - man
Com Ramp UpSteam
Con Ramp Down Ej
Exposure Temp
Pressure
Atmospheric
Vac Dry SetPoint
1
2
3
4
5
6
7
8
9
Time
Purge Time
Negative Pulse 1
Negative Pulse 2
Conditioning Pul
Exposure Time
Drying Time
WS-0051 633LS

Cycle No. P

Cycle Name vac

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings
Parameter Check		14.9 to 300.0	0.01	29.9
Purge Time		00:01:30 to 00:10:00	1 sec.	00:02:30
Con Ramp UpSteam		2.00 to 50.00 psi/min	0.01	50.00 psi/min
Conditioning Pul		00000 to 00010	1	3
PP 0=auto 1=man		00000 or 00001	1	0
PosPul(PP) - man		15.00 to 32.00 psia	0.01	30.00 psia
Con Ramp Down Ej		2.00 to 50.00 psi/min	0.01	50.00 psi/min
Negative Pulse 1		1.00 to 15.00 psia	0.01	9.75 psia
Negative Pulse 2		1.00 to 15.00 psia	0.01	4.75 psia
Exposure Time		00:01:00 to 06:00:00	1 sec.	00:30:00
Vac Dry SetPoint		1.00 to 15.00 psia	0.01	4.75 psia
Dry Time		00:00:15 to 12:00:00	1 sec.	00:15:00
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00
Exposure Temp		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	121.1°C (250.0°F)

633LS PREVAC

A07028-DM1

FIGURE A–9, SHEET 2. 633LS PREVACUUM CYCLE WORKSHEET

Cycle No. P Cycle Name vac

EXTENDED PARAMETERS Screen

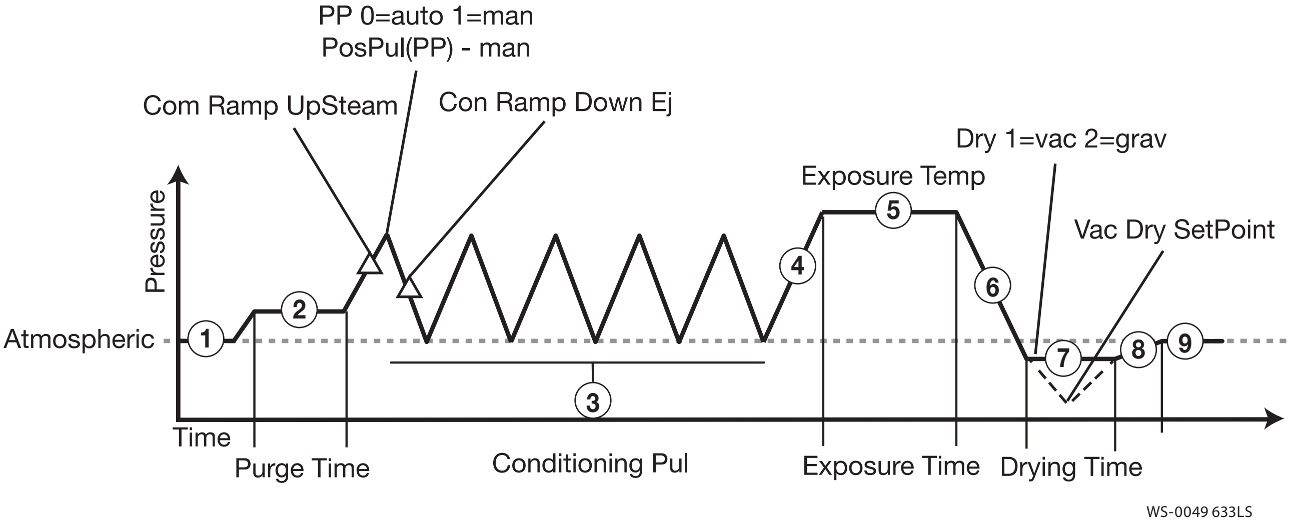
		Range	Resolution	Factory Settings
Gasket Heat Time (see Note 2)		00:00:05 to 00:00:30	1 sec.	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	60.0°C (140.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0°C (1.8 to 36.0°F)	0.1°	5.0°C (9.0°F)

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.
3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633LS PREVAC

A07028-DM2

FIGURE A–10, SHEET 1. 633LS GRAVITY CYCLE WORKSHEET


PP 0=auto 1=man
PosPul(PP) - man
Com Ramp UpSteam
Con Ramp Down Ej
Dry 1=vac 2=grav
Exposure Temp
Vac Dry SetPoint
Pressure
Atmospheric
1
2
3
4
5
6
7
8
9
Time
Purge Time
Conditioning Pul
Exposure Time
Drying Time
WS-0049 633LS

Cycle No. P Cycle Name grv

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings
Parameter Check		14.9 to 300.0	0.01	29.9
Purge Time		00:01:30 to 00:10:00	1 sec.	00:02:30
Con Ramp UpSteam		2.00 to 50.00 psi/min	0.01	50.00 psi/min
Conditioning Pul		00000 to 00010	1	5
PP 0=auto 1=man		00000 or 00001	1	0
PosPul(PP) - man		15.00 to 32.00 psia	0.01	30.00 psia
Con Ramp Down Ej		2.00 to 50.00 psi/min	0.01	50.00 psi/min
Exposure Time		00:01:00 to 06:00:00	1 sec.	00:30:00
Dry 1=vac,2=grav		00001 or 00002	1	2
Vac Dry SetPoint		1.00 to 15.00 psia	0.01	4.75 psia
Dry Time		00:00:15 to 12:00:00	1 sec.	00:15:00
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00
Exposure Temp		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	121.1°C (250.0°F)

633LS GRAVITY A07028-DN1

FIGURE A–10, SHEET 2. 633LS GRAVITY CYCLE WORKSHEET

Cycle No. P Cycle Name grv

EXTENDED PARAMETERS Screen

		Range	Resolution	Factory Settings
Gasket Heat Time (see Note 2)		00:00:05 to 00:00:30	1 sec.	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	60.0°C (140.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0°C (1.8 to 36.0°F)	0.1°	5.0°C (9.0°F)

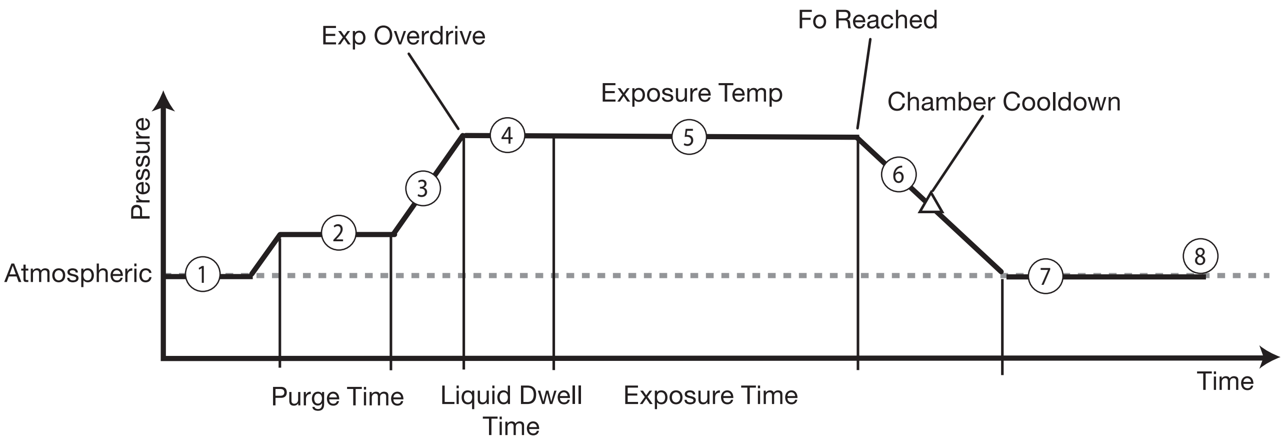
☞

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.
3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633LS GRAVITY

A07028-DN2

FIGURE A–11. 633LS LIQUIDS CYCLE WORKSHEET



Cycle No. P Cycle Name liq

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings
Parameter Check		14.9 to 300.0	0.01	29.9
Purge Time		00:02:30 to 00:10:00	1 sec.	00:02:30
Exposure Temp		110.0 to 135.0°C (230.0 to 275.0°F)	0.1°	121.1°C (250.0°F)
Exp Overdrive		0.0 to 2.0°C (0.0 to 3.8°F)	0.1°	1.0°C (1.8°F)
Liquid Dwell Time		00:00:00 to 00:30:00	1 sec.	00:00:00
Exposure Time		00:00:00 to 06:00:00	1 sec.	00:30:00
Fo Value Reached		0.0 to 100.0	0.1	0.0
Chamber Cooldown		0.00 to 5.00 psi/min	0.01	0.75
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00

EXTENDED PARAMETERS Screen

		Range	Resolution	Factory Settings
Gasket Heat Time (see Note 2)		00:00:05 to 00:00:30	1 sec.	00:00:10
Start Drain Cool (see Note 3)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	60.0°C (140.0°F)
Drain Cool Diff (see Note 3)		1.0 to 20.0°C (1.8 to 36.0°F)	0.1°	5.0°C (9.0°F)

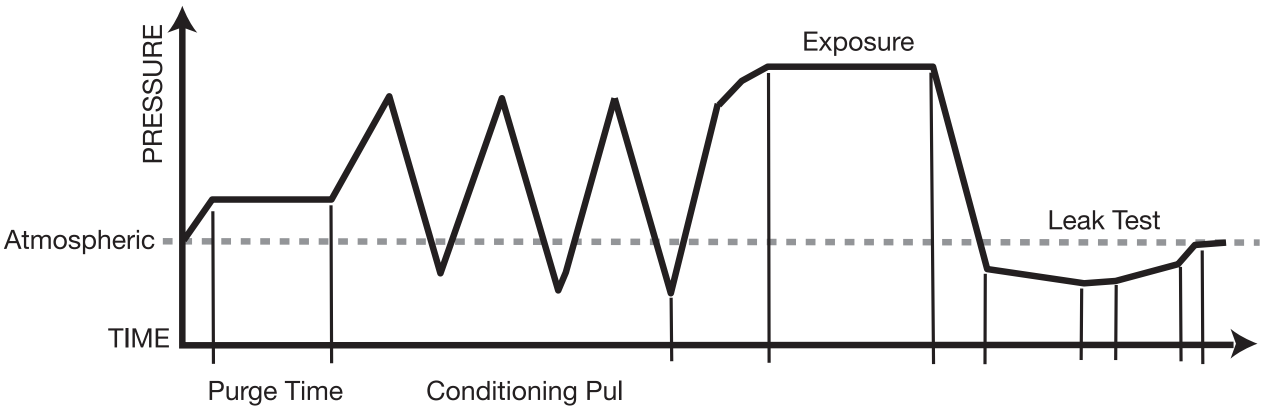
☞

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. Gasket heatup only occurs if the jacket temperature is below 100°C when START is pressed.
3. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633LS LIQUIDS

A07028-DP

FIGURE A–12. 633LS VACUUM LEAK TEST CYCLE WORKSHEET



Cycle No. P Cycle Name lkt

EDIT PARAMETERS Screen

		Range	Resolution	Factory Settings
Blowdown Durat. (see Note 1)		00:00:00 to 00:00:20	1 sec.	00:00:00

EXTENDED PARAMETERS Screen

		Range	Resolution	Factory Settings
Start Drain Cool (see Note 2)		50.0 to 70.0°C (122.0 to 158.0°F)	0.1°	50.0°C (122.0°F)
Drain Cool Diff (see Note 2)		1.0 to 20.0 °C (1.8 to 36.0 °F)	0.1°	5.0°C (9.0°F)

☞

1. For units with the Auto Blow-Down package, blow-down will occur at the time specified on the Alarm Clock screen. When the blow-down occurs, the Blowdown Durat. value for the last cycle selected will be used.
2. The temperature of the water discharged from the sterilizer is monitored to comply with plumbing codes. Start Drain Cool is the setpoint and Drain Cool Diff is the deadband for this temperature control function.

633LS LEAK TEST

A07028-DS

STERILIZER CONFIGURATION

MODEL 633HC

The configuration worksheet (Figure A–13) provides a convenient way to record the sterilizer's configuration settings and calibration information.

FIGURE A–13. 633HC CONFIGURATION WORKSHEET

CONFIGURATION Menu

MACHINE NAME	____________			
LANGUAGE DATE UNITS	LANGUAGE	*ENGLISH*	*SPANISH*	*FRENCH*
	DATE FORMAT	*MM/DD/YYYY*	*DD/MM/YYYY*	*YYYY/MM/DD*
	PRESSURE UNIT	*PSIA*	*KPA*	*BARS*
	TEMP UNIT	*°F*	*°C*	
PANEL SETUP	DEFAULT MENU	*DETAILS*	*PLOT GRAPH*	*BAR GRAPH*
	PARAMETER EDIT	*QUICK*	*FULL*	
	SCREEN SAVER	*Time:* ______	*min.*	
	CONFIRM SAVE/CANCEL	*YES*	*NO*	
		Time	*M T W T F S S*	
ALARM CLOCK	AUTO BLOW-DOWN	________	____________	
	UTILITIES OFF	________	____________	
	UTILITIES ON	________	____________	

CALIBRATION Menu

MANUAL CALIBRATION

SENSOR	GAIN	OFFSET
Chamber Temp	________	________
Jacket Temp	________	________
Drain Temp	________	________
Chamber PSIA	________	________

DIPSWITCHES Screen

DS01	SD=0 DD=1	*0*	*1*
DS03	DD Close I/L	*0*	*1*
DS07	Boiler B.D.	*0*	*1*
DS08	Utility S.D.	*0*	*1*
DS11	Parameter Check	*0*	*1*
DS13	T-Doc	*0*	*1*
DS14	Water Saver	*0*	*1*
DS16	Unit size is 26"	*0*	*1*
DS17	Unit size is 51"	*0*	*1*
DS18	Unit size is 39"	*0*	*1*
DS20	Service Mode	*0*	*1*

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MODEL 633LS

The configuration worksheet (Figure A–14) provides a convenient way to record the sterilizer's configuration settings and calibration information.

FIGURE A–14. 633LS CONFIGURATION WORKSHEET

CONFIGURATION Menu

MACHINE NAME ____________

LANGUAGE DATE UNITS	LANGUAGE	*ENGLISH*	*SPANISH*	*FRENCH*
	DATE FORMAT	*MM/DD/YYYY*	*DD/MM/YYYY*	*YYYY/MM/DD*
	PRESSURE UNIT	*PSIA*	*KPA*	*BARS*
	TEMP UNIT	*°F*	*°C*	
PANEL SETUP	DEFAULT MENU	*DETAILS*	*PLOT GRAPH*	*BAR GRAPH*
	PARAMETER EDIT	*QUICK*	*FULL*	
	SCREEN SAVER	*Time:* ______	*min.*	
	CONFIRM SAVE/CANCEL	*YES*	*NO*	

		Time	*M T W T F S S*
ALARM CLOCK	AUTO BLOW-DOWN	________	____________
	UTILITIES OFF	________	____________
	UTILITIES ON	________	____________

CALIBRATION Menu

MANUAL CALIBRATION

SENSOR	GAIN	OFFSET
Chamber Temp	________	________
Jacket Temp	________	________
Load Temp	________	________
Drain Temp	________	________
Chamber PSIA	________	________

DIPSWITCHES Screen

DS01	SD=0 DD=1	*0*	*1*
DS02	DD Unidirect	*0*	*1*
DS03	DD Seal I/L	*0*	*1*
DS04	DD Close I/L	*0*	*1*
DS07	Boiler B.D.	*0*	*1*
DS08	Utility S.D.	*0*	*1*
DS09	Load Probe	*0*	*1*
DS10	Vacuum Pump	*0*	*1*
DS11	Parameter Check	*0*	*1*
DS13	T-Doc	*0*	*1*
DS14	Water Saver	*0*	*1*
DS16	Unit size is 26"	*0*	*1*
DS17	Unit size is 51"	*0*	*1*
DS18	Unit size is 39"	*0*	*1*
DS20	Service Mode	*0*	*1*

A07028-P

APPENDIX B SYSTEM AND USER FLAGS

SYSTEM FLAGS

System flags indicate events that occur in the operating system (C language) portion of the control software.

TABLE B–1. SYSTEM FLAGS

Flag ID	Functional Name	Description
SF000 thru SF010		Not used for this model.
SF011	PANEL 1 MASTER	First panel is master. SF11 – SF15 are used for handling the master/slave concept for operator panels and are controlled by the Boolean program. One of the panels is defined as the master panel, all others are slaves. The master panel is accepted to start a program and to change the program parameters.
SF012	PANEL 2 MASTER	Second panel is master.
SF013	RS232 master	External computer is master.
SF014 SF015		Not used for this model.
SF016	PIT EXCEEDED	This flag is set if the power supply has been interrupted longer than the Power Interrupt Time set in the system configuration.
SF017 SF018		Not used for this model.
SF019	ON OFF FLAG	Toggled every 250 ms.
SF020	BLANK TEXT	Resets all information and error text if set. The system resets this flag.
SF021	CYCLE EXECUTED	This flag should be set for every executed sterilizer cycle in order to increment the service interval cycle counter. The system resets this flag.
SF022	START LOGG	This flag is used for starting and stopping the PACS 3500 and panels logging. It also starts and stops the graphics in process pictures.
SF023	SLOW LOGG	Activates the long logging interval set in the printer definition menu (non-exposure phases when in cycle).
SF024	FAST LOG	Activates the short logging interval set in the printer definition menu (exposure and liquid exposure phases only).

TABLE B–1. SYSTEM FLAGS

Flag ID	Functional Name	Description
SF025	ALARM PHASE	Alarm phase PH9998 is activated when this flag is set.
SF026	BUZZER	All panel buzzers are activated when this flag is set.
SF027 SF028		Not used for this model.
SF029	PC DISK LOG	The log sent to the CS1000 or T-Doc is stored on disk if this flag is set.
SF030		Not used for this model.
SF031	LOG	A log is printed out when this flag is set.
SF032	AI. CH 00 ERROR	Indicates an error at the analog input channel 0. The flag is reset if the input is resumed.
SF033	AI. CH 01 ERROR	Indicates an error at the analog input channel 1. The flag is reset if the input is resumed.
SF035	AI. CH 03 ERROR	Indicates an error at the analog input channel 3. The flag is reset if the input is resumed.
SF036 thru SF127		Not used for this model.
SF128	DO MOD. 0 ERROR	This flag is set if communication with Digital Output module 0 has failed 10 times in sequence. Resets at power up.
SF129	DO MOD. 1 ERROR	This flag is set if communication with Digital Output module 1 has failed 10 times in sequence. Resets at power up.
SF130	DO MOD. 2 ERROR	This flag is set if communication with Digital Output module 2 has failed 10 times in sequence. Resets at power up.
SF131 thru SF135		Not used for this model.
SF136	DI MOD. 0 ERROR	This flag is set if communication with Digital Input module 0 has failed 10 times in sequence. Resets at power up.
SF137	DI MOD. 1 ERROR	This flag is set if communication with Digital Input module 1 has failed 10 times in sequence. Resets at power up.
SF138 thru SF150		Not used for this model.
SF151	MANUAL MODE SET	This flag is set if any digital output is in manual mode.

TABLE B–1. SYSTEM FLAGS

Flag ID	Functional Name	Description
SF152 thru SF161		Not used for this model.
SF162	LOGG VAR 1 – 20	This flag indicates which log group is printed.
SF163 SF164		Not used for this model.
SF165	BATTERY LOW	This flag is set when the battery power is low.
SF166		Not used for this model.
SF167	PRINT REALTIME	Prints real time and date
SF168 thru SF178		Not used for this model.
SF179	CORRECT PROCESS	Set after a correct process and remaining time is updated.
SF180 SF181		Not used for this model.
SF182	SCREEN ON/OFF	Associated with the CONTROLS ON/OFF button. Set when the controls are OFF. Resets when the controls are ON.
SF183	CYCLE SELECTED	Sets after the ENTER button is pressed when selecting a new cycle. Resets after one second.
SF184 thru SF256		Not used for this model.

USER FLAGS

User flags indicate events that occur in the application program (Boolean language) portion of the control software

TABLE B–2. USER FLAGS

Flag ID	Functional Name	Description
UF000	Process Failure	Set when process failure occurs.
UF001	Start OK	Set when cycle can be started (no failure conditions, doors OK).
UF002	Door Unseal OK	Set when chamber pressure is within 2 psi of atmosphere.
UF003	Confirm Abort	Set when cycle is aborted.
UF004	In Progress	Set when cycle is in progress.
UF005	Cycle Good	Set when cycle is completed (unidirectional doors).
UF006	Always True Flag	Set always.
UF007	uni Re-enabled	633LS only: Set when remote end (RE) door can be opened (unidirectional doors).
UF008	uni CE unsld last	633LS only: Set when control end (CE) door was the last door unsealed (unidirectional doors).
UF009	uni RE unsld last	633LS only: Set when remote end (RE) door was the last door unsealed (unidirectional doors).
UF010	Negative Pulse 1	Set when negative pulse 1 is in progress (first pulse).
UF011	Negative Pulse 2	Set when negative pulse 2 is in progress (subsequent pulses).
UF012	Chamber Temp Low	Set when chamber temperature is below allowable range.
UF013	Chamb Temp High	Flag is never set.
UF014	Clear Pressed	Set when CLEAR/ALARM is pressed.
UF015	Prt Manual Mode	633LS only: Set if manual mode is set during cycle.
UF016	Loss of Dr Sw	Set when door switch or pressure switch input is lost.
UF017	Start phs	Set when the controls are in the start phase.
UF018		Not used for this model.
UF019	Standby phs	Set when the controls are in the standby phase.
UF020	Cycle Complete	Set when the controls are in the cycle complete phase.

TABLE B–2. USER FLAGS

Flag ID	Functional Name	Description
UF021 thru UF024		Not used for this model.
UF025	Liq Exh Too Fast	Set when the liquid exhaust phase exceeds the programmed rate.
UF026	Fo Auto Selected	633LS only: Set when an F0 greater than 0.0 is selected (load probe option).
UF027	LoadPrb-Config	633LS only: Set when unit is configured with a load probe (load probe option).
UF028	Load Probe Instr	633LS only: Set when controls detect that the load probe is inserted (load probe option).
UF029	Liquid Cycle	Set when a liquid cycle is selected.
UF030	Liq Lev – 1sec	Set when liquid is detected in the drain for 1 second. Secondary drain valve 14SV opens.
UF031	Liq Lev – 6sec	Set when liquid is detected in the drain for 6 seconds. Ejector and chamber drain valve 2SV opens.
UF032	Liq Lev – 11sec	Set when liquid is detected in the drain for 11 seconds. WATER IN DRAIN message occurs.
UF033	Fault non cyc/dr	Set when a fault occurs when not in cycle.
UF034	End Liq Exh	Service diagnostic flag. If the door has been manually retracted during a cycle, this flag is set in Liq Exhaust so the controls have a way to exit the phase.
UF035	D/D Doors Closed	Set when both doors are closed (double door units).
UF036	S/D Door Closed	Set when door is closed (single door units).
UF037	Cool the drain	Set when Start Drain Cool setpoint is exceeded.
UF038	Gravity Dry Jump	Set when gravity dry is selected.
UF039	Chmbr TmpLow Blk	Set when exposure temperature is low.
UF040	Chk for Temp Low	When set, the controls check for low temperature during the exposure phase.
UF041	Reached Neg Pul	Set when negative pulse setpoint is reached.
UF042		Not used for this model.
UF043	Dr Sw Fail T/O	Set when there has been an automatic ABORT - DR SW message while in cycle.

TABLE B–2. USER FLAGS

Flag ID	Functional Name	Description
UF044	Buff TI Complete	Set when a non-RTD related an error is seen and has been present for more than 1 second.
UF045	Start Buff TI	Set when a non-RTD related an fault or failure occurs. Starts a 1 second buffer which prevents momentary conditions from causing a fault or failure.
UF046	WS - Config	Set when the unit is configured with the water-saver option.
UF047 UF048		Not used for this model.
UF049	LS	633LS only: Reserved
UF050	BBD - Config	Set when the unit is configured with the automatic boiler blowdown option.
UF051	USD – Config	Set when unit is configured with the utility shutdown option.
UF052	Vac Pmp - Config	633LS only: Set when the unit is configured with the vacuum pump option.
UF053	Jkt Byps Config	633HC only: Set when unit is configured with the jacket bypass option.
UF054	Already Jumped	Set after the CYCLE RESULTS section has been printed following a good cycle.
UF055	Set MORE	This is set to allow a phase to be manually advanced or aborted.
UF056	Set Abort BT	This is set to allow a phase to be manually aborted.
UF057	Set Phs Adv BT	This is set to allow a phase to be manually advanced.
UF058	NegP: 1 & 5 off	Set when water-saver or vacuum pump is on during a negative pulse.
UF059	Cycle Aborted	Set when cycle is aborted.
UF060	Start RTD Buf TI	Set when an RTD related fault or failure occurs. Starts a 3 second buffer which prevents momentary conditions from causing a fault or failure.
UF061	RTD Buf TI Cmplt	Set when an RTD related error is seen and has been present for more than 3 seconds.
UF062	Manual Abort Act	Set when a cycle has been manually aborted.
UF063	Abort to Exh	Set when an abort occurs during a non-liquid cycle.
UF064	Abort to Liq Exh	Set when an abort occurs during a liquid cycle.

TABLE B–2. USER FLAGS

Flag ID	Functional Name	Description
UF065	At Temp	Set when the chamber temperature is greater than the exposure setpoint. Reset when the temperature is below the setpoint.
UF066	Timer Started	Set when the chamber temperature is greater than the exposure setpoint for the first time. Stays set until the cycle is complete.
UF067	CE Seal attmpted	633LS only: Set after control end (CE) door is sealed at start of cycle.
UF068	RE Seal attmpted	633LS only: Set after remote end (RE) door is sealed at start of cycle.
UF069	Fault in cyc/dr	Set when a fault or failure occurs when in cycle.
UF070	Open CE Door	Set when appropriate condition is satisfied that tells the controls to open the CE Door.
UF071	Close CE Door	Set when appropriate condition is satisfied that tells the controls to close the CE Door.
UF072	Seal CE Door	Set when appropriate condition is satisfied that tells the controls to seal the CE Door.
UF073	Unseal CE Door	Set when appropriate condition is satisfied that tells the controls to unseal the CE Door.
UF074	Open RE Door	Set when appropriate condition is satisfied that tells the controls to open the RE Door.
UF075	Close RE Door	Set when appropriate condition is satisfied that tells the controls to close the RE Door.
UF076	Seal RE Door	633LS: Set when appropriate condition is satisfied that tells the controls to seal the RE Door (door seal interlock and unidirectional doors)
UF077	Unseal RE Door	633LS: Set when appropriate condition is satisfied that tells the controls to unseal the RE Door (door seal interlock and unidirectional doors).
UF078 UF079		Not used for this model.
UF080	Liq Exp Dropout	633HC: RESET - TEMP LOW situation. Controls exit liquid exposure and go back to liquid heat-up to heat the chamber.
UF081	121.1 Cycle	Set when jacket temperature at start of purge is less than or equal to 129.9°C.
UF082	135.0 Cycle	Set when jacket temperature at start of purge is greater than 129.9°C
UF083		Not used for this model.

TABLE B–2. USER FLAGS

Flag ID	Functional Name	Description
UF084	Mt DD-S Seal	Set to maintain a door seal (hold DO10 on). (standard double door and door close interlock)
UF085	Mt DD-S Unseal	Set to maintain a door unseal (hold DO11 on). (standard double door and door close interlock)
UF086	Mt CE Seal	Set to maintain a control end (CE) door seal (hold DO10 on) (single door, door seal interlock, and unidirectional doors).
UF087	Mt RE Seal	633LS only: Set to maintain a remote end (RE) door seal (hold DO16 on) (single door, door seal interlock, and unidirectional doors).
UF088	Mt CE Unseal	Set to maintain a control end (CE) door unseal (hold DO011 on). (single door, door seal interlock and unidirectional doors)
UF089	Mt RE Unseal	Set to maintain a remote end (RE) door unseal (hold DO017 on) (door seal interlock and unidirectional doors)
UF090		Not used for this model.
UF091	SD Power	Set when the sterilizer is configured as a single door unit.
UF092		Not used for this model.
UF093	DD P-Standard	Set when the sterilizer is configured as a standard double door unit.
UF094		Not used for this model.
UF095	DD P-Unidirect	633LS only: Set when the sterilizer is configured as a unidirectional door unit.
UF096	LS	633LS: Reserved
UF097	DD S/L	633LS only: Set when the sterilizer is configured as a double door seal interlock unit.
UF098	LS	633LS only: Reserved
UF099		Not used for this model.
UF100	DD C/L	Set when the sterilizer is configured as a double door close interlock unit.
UF101		Not used for this model.
UF102	Seal Other Door	633LS only: Set to seal the opposite end door.
UF103		Not used for this model.
UF104	RE Flush Gasket	633LS only: Set when the jacket temperature falls below 100°C (only during standby). Reset following next door seal (door seal interlock and unidirectional doors).

TABLE B–2. USER FLAGS

Flag ID	Functional Name	Description
UF105	CE Flush Gasket	Set when the jacket temperature falls below 100°C (only during standby). Reset following next door seal.
UF106	Alarm Enable	Set when an alarm is enabled.
UF107	CC: Print TOD	Set after time of day has been printed following a complete cycle.
UF108	Process Alarm	Set when a phase-specific error condition occurs during cycle.
UF109	System Alarm	Set when an error condition occurs during cycle.
UF110	Alarm Silence	Set when CLEAR/ALARM is pressed to silence the alarm tone.
UF111	Cleared (Disable)	Set when alarm is cleared.
UF112		Not used for this model.
UF113	Start TI Fo	Set when the controls have read a low parameter check value.
UF114	P-meters Low	Set when the controls have read a low parameter check value.
UF115	Prt Actual Time	Set when controls have been turned OFF, then ON while in cycle.
UF116	Controls Off	Set when the controls have been turned OFF.
UF117	Text on scrn -usd	Set if CE DOOR OPEN, RE DOOR OPEN, BATTERY LOW, or MANUAL MODE info text is visible and the controls are in utility shutdown mode.
UF118	Utility Shutdown	Set when the controls are in utility shutdown mode.
UF119	Manual Phs Adv	Set when the [PHS ADV] softkey has been pressed. Resets after the advance has been executed.
UF120 UF121		Not used for this model.
UF122	BBD subphs 1	Set when the controls have been turned off during the first subphase of boiler blowdown.
UF123	Man Phs Adv Code	Set when a cycle has been manually advanced.
UF124		Not used for this model.
UF125	BBD Active	Set when the controls are in boiler blowdown mode.
UF126	USD Pause	Set when utility shutdown mode has been paused.
UF127	BBD Complete	Set when boiler blowdown mode has been completed.
UF128		Not used for this model.

TABLE B–2. USER FLAGS

Flag ID	Functional Name	Description
UF129	Leaktest Cycle	Set when vacuum leak test cycle is selected.
UF130	Gravity Cycle	Set when gravity cycle is selected.
UF131	Non-Gravity Cycle	Set when selected cycle is not a gravity cycle.
UF132		Not used for this model.
UF133	reverse for 2sec	Set when obstruction switch is actuated.

APPENDIX C TOOLS AND MATERIALS—SPECIFICATIONS

TEST EQUIPMENT

PRESSURE METER

The Handheld Pressure Calibrator Package (Getinge PN 536593) includes:

- Heise PTE-1 base unit with batteries
- 0-60 PSIA pressure module
- 316 SST isolation unit
- AC adapter
- carrying case

PRESSURE METER—STANDARD FOR PSIA METER

Accuracy required for pressure calibration standard:

- Range: 0 to 50 psia with 100 psia minimum over-pressure
- Each calibration to be NBS traceable with calibration report
- Supply voltage: 120 VAC, 47 to 63 Hz
- Medium capacity
    - water/steam
    - air
- Accuracy (of display): ±0.05 PSI at 25°C

  Accuracy errors shall include all of the following:
    - linearity
    - repeatability
    - hysteresis at 25°C
    - sensitivity
    - NBS traceability
- Temperature range (operating): 0°C to 70°C
- Temperature range (storage): -40°C to 85°C
- Temperature drift: ±0.0025 PSI/°C
- Warm-up time: 20 minutes (minimum)

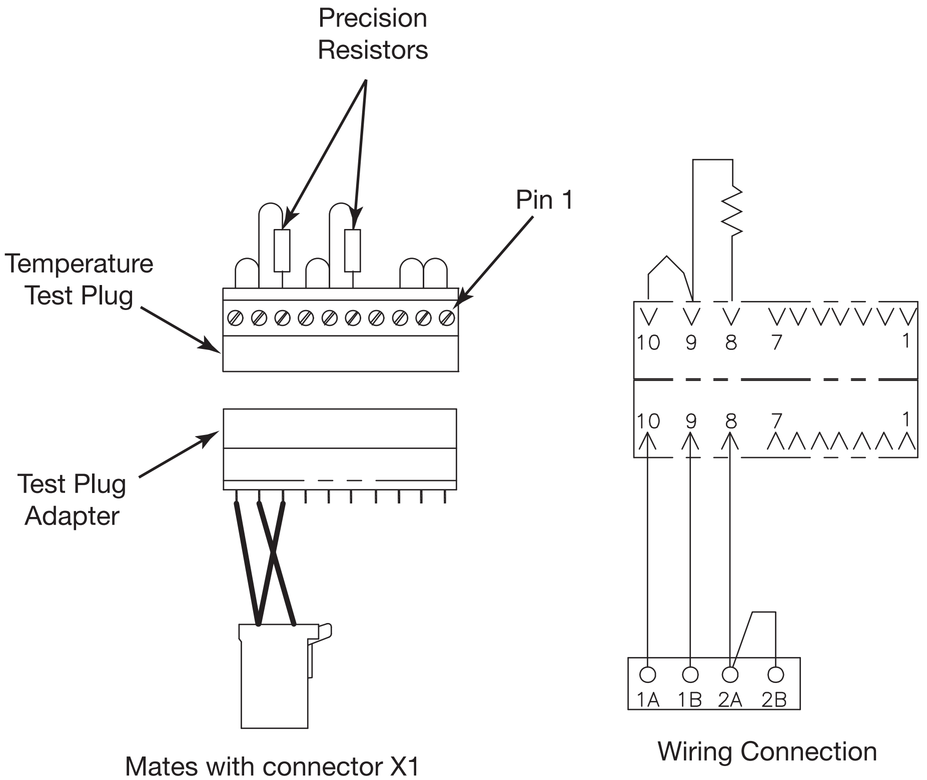
TEMPERATURE TEST PLUGS

The temperature test plugs and adapter are used during automatic calibration of the analog input circuit. The test plugs simulate a resistive temperature device (RTD) at 15.0°C (59.0°F) and 143.0°C (289.4°F).

☞ ***NOTE***

In a temperature sensing circuit, the analog input circuit on the CM10 board is more likely to drift than the RTD. Automatic calibration using the temperature test plugs is adequate for most applications. To calibrate the temperature sensors with the RTD in the circuit, see “Calibrating the Temperature Sensors (Using Ice and Oil Baths)” on page 9–12.

FIGURE C–1. TEMPERATURE TEST PLUG AND ADAPTER



Precision Resistors
Pin 1
Temperature Test Plug
Test Plug Adapter
10
9
8
7
1
10
9
8
7
1
1A
1B
2A
2B
Wiring Connection

Mates with connector X1
on CM10 Board:

- Chamber RTD—positions 1 & 2
- Jacket RTD—positions 3 & 4
- Drain RTD—positions 9 & 10

A07028-DF

TABLE C–1. TEMPERATURE TEST PLUGS

Temperature	Resistance	Part No.
143.0°C (289.4°F)	154.70 ohms, 0.05%	517506
15.0°C (59.0°F)	105.85 ohms, 0.05%	517507

Adapter plug: Getinge PN 61301607454

TDS METER

Watts Handheld TDS Meter (Getinge PN 61301605543)

The handheld TDS meter is used to measure the total dissolved solids (TDS) in a water sample. The meter displays the TDS in parts per million (ppm).

The TDS meter is used to determine the extend of sediment and scale inside a boiler. If the TDS value of the boiler drain water exceeds the *“Recommended Limits Within a Boiler” on page 4–31*”, the boiler needs to be blown down more frequently.

TOOLS

TORQUE WRENCH/DRIVER SET

STERILIZER HARDWARE

The sterilizer has several brackets that are attached to extrusions using button head screws and T-nuts. The door assembly also has a tension adjustment that needs to be tightened to a specific torque. To adjust the bracket hardware and spring tension, torque driver must be able to measure 10, 15, and 20 ft-lbs. The adjustment screws require a hex socket driver.

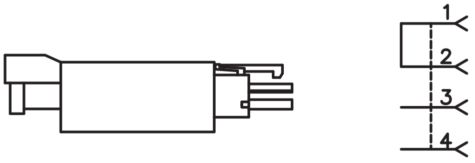
STEAM BOILER HARDWARE

Torque wrench/driver must be adjustable to 20, 45, and 110 in-lbs. Three-phase supply terminals and contactors require flat-blade driver; element terminals and element flange bolts require hex socket drivers.

SERVICE MODE JUMPER

The service mode jumper (PN 61301600775) bypasses the door obstruction sensor circuit, allowing the photo eyes to be disconnected. This jumper must be connected to 14J inside the Door I/F Box and the controls must be set to Service Mode (DS2) before the door cover can be removed.

FIGURE C–2. SERVICE MODE JUMPER



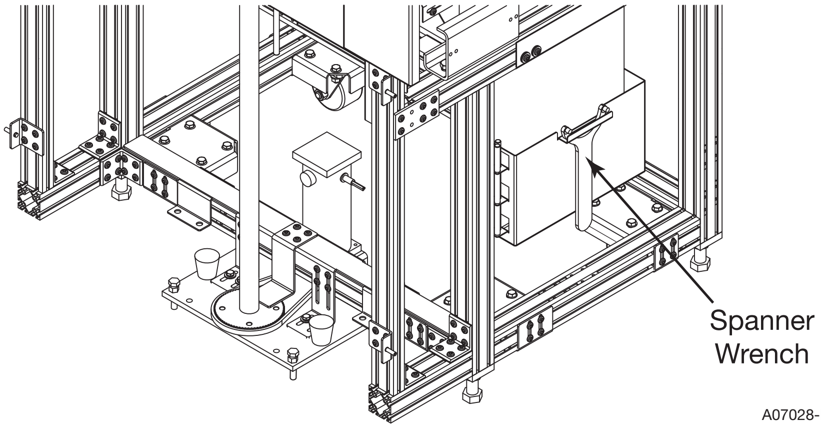
Wiring Diagram

A07028-DH

SPANNER WRENCH

The spanner wrench (PN 61301607357) is used to raise and lower the door by turning the lift screw pulley. When not in use, the spanner wrench is stored in a holder on the lower right side of the sterilizer.

FIGURE C–3. SPANNER WRENCH STORAGE LOCATION



A07028-DL

MATERIALS

SYNTHETIC GREASE LUBRICANT	Synthetic grease lubricant (PN 61301605061) is available in 3 oz. tubes.

APPENDIX D PARAMETER CHECK FEATURE

INTRODUCTION

WARNING
The sterilizer controls allow flexibility in selecting cycle parameters that may not achieve the desired sterility assurance level (SAL). Users with password access are responsible for the efficacy of any cycles other than the factory set parameters.

The sterilizer is shipped with parameter check enabled. Each cycle has a minimum parameter check value that is based on factory set parameters. If an exposure time or temperature lower than the factory setting is selected, *LOW CYCLE VALUES* appears in red and *ENTER TO EDIT* appears in blue at the bottom of the screen.

NOTE
The LOW CYCLE VALUES condition does not prevent the cycle from starting. If the cycle is run without adjusting the cycle parameters, LOW CYCLE VALUES displays until the cycle is started. The message is printed when START is pressed.

The parameter check is a calculation based on the time and the temperature selected. If a combination of time and temperature represents a process lethality calculation less than the factory settings, a *LOW CYCLE VALUES* message is displayed.

The parameter check feature may be disabled by setting DIP switch DS11 Parameter Check to 0. See *“Enabling the Parameter Check Feature” on page 5–54*.

HC MODELS

NOTE
On HC models, the parameter check limit is not adjustable.

The parameter check limit allows the user to compare exposure times at different temperatures. The parameter check limit may be considered equivalent to exposure time in minutes at 250.0°F (121.1°C). For example, if the parameter check limit is 30.0, selecting a 3:00 minute exposure at 275.0°F (135.0°C) is equivalent to 30:00 minutes at 250.0°F (121.1°C).

TABLE D–1. PARAMETER CHECK VALUES FOR HC MODELS

Cycle	Parameter Check Limit	Factory Settings		Equivalent Exposure Time at 250.0°F	Graph
		Exp. Time	Exp. Temp.		
PREVAC1	73.4	3:00	275.0°F	73:24	*Figure D–2 on page D–4*
PREVAC2					
GRAVITY1	29.9	30:00	250.0°F	30:00	*Figure D–3 on page D–5*
GRAVITY2	245.1	10:00	275.0°F	6:05:06	*Figure D–4 on page D–5*
FLASH 3+	73.4	3:00	275.0°F	73:24	*Figure D–5 on page D–6*
FLASH 10+	245.1	10:00	275.0°F	6:05:0	*Figure D–6 on page D–6*
LIQUIDS	29.9	30:00	250.0°F	30:00	*Figure D–7 on page D–7*

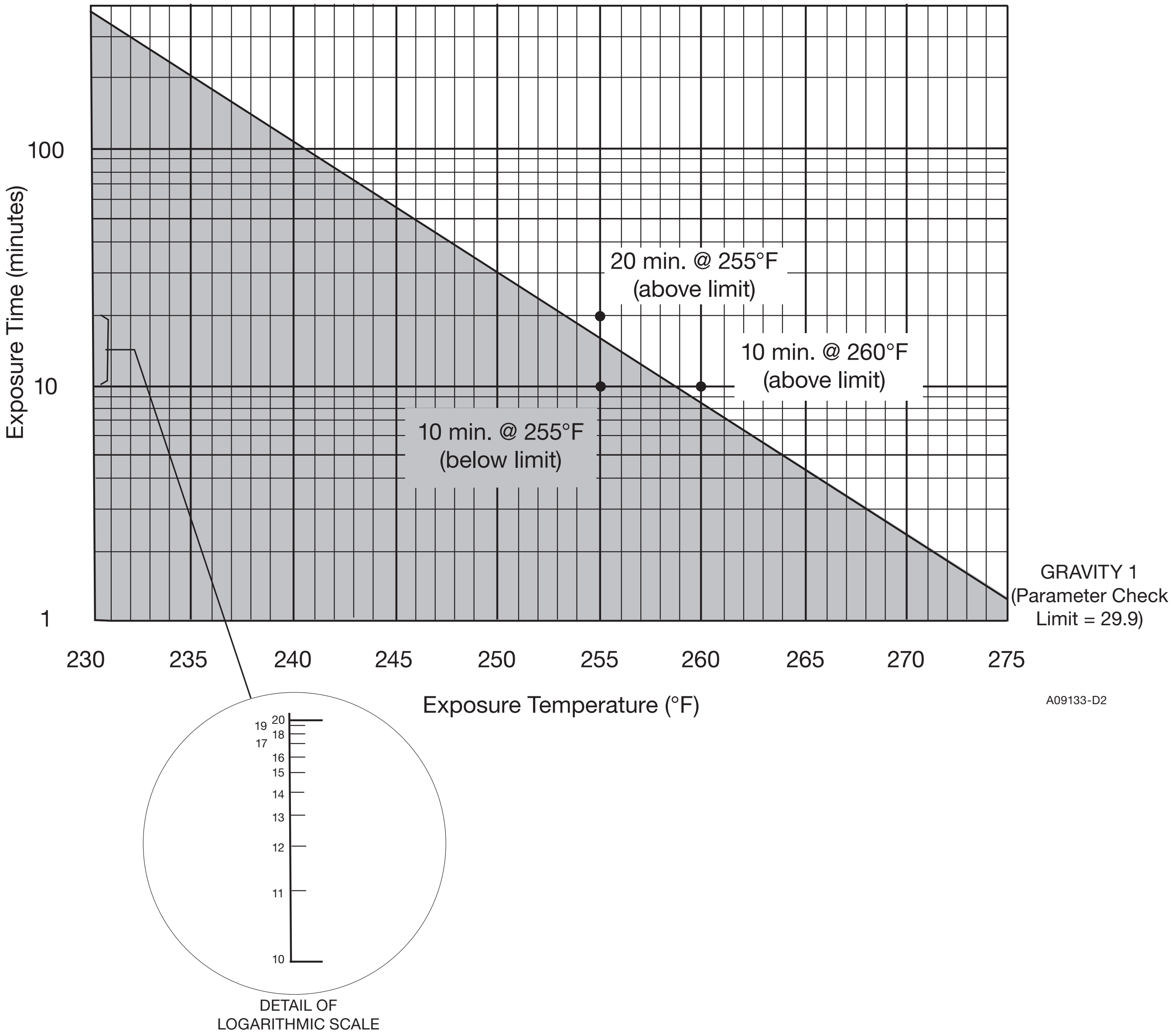
ESTIMATING VALID CYCLE PARAMETERS

The graphs in this section provide a visual means of determining whether a specific cycle setting is above the parameter check limit.

To estimate whether given cycle parameters are valid:

1. Refer to Figure D–1. On the graph, exposure temperature is measured on the x-axis and exposure time on the y-axis. The parameter check limit for the Gravity 1 cycle is the solid diagonal line. The shaded area indicates cycle settings that will result in a LOW CYCLE VALUES message.

FIGURE D–1. PARAMETER CHECK EXAMPLE



NOTE

Note that the y-axis (exposure time) is a logarithmic scale. The divisions on the y-axis are not evenly spaced. For example, the number 15 is not halfway between 10 and 20, but closer to 20 than to 10.

2. Locate the point on the graph where 10 minutes exposure time intersects 255°F exposure temperature. Because this point is located in the gray area below the line, selecting a cycle with these settings will result in a *LOW CYCLE VALUES* message.

3. To find an exposure time above the parameter check limit, increase the exposure time or exposure temperature until the new settings are above the diagonal. In this example, 20 minutes at 255°F or 10 minutes at 260°F are above the parameter check limit.

   Figures D–3 through D–7 are parameter check limit graphs for the Prevac, Gravity, Flash, and Liquids cycles respectively.

FIGURE D–2. PREVAC CYCLES

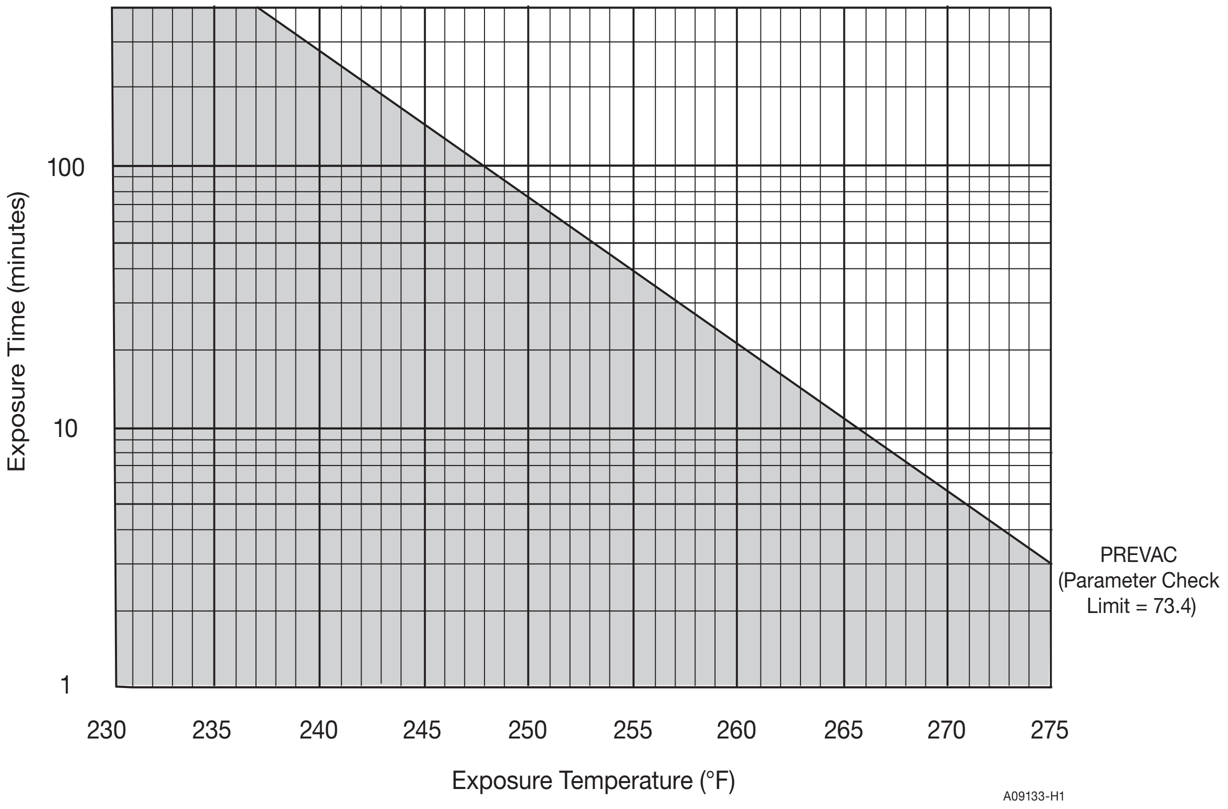


FIGURE D–3. GRAVITY 1 CYCLE

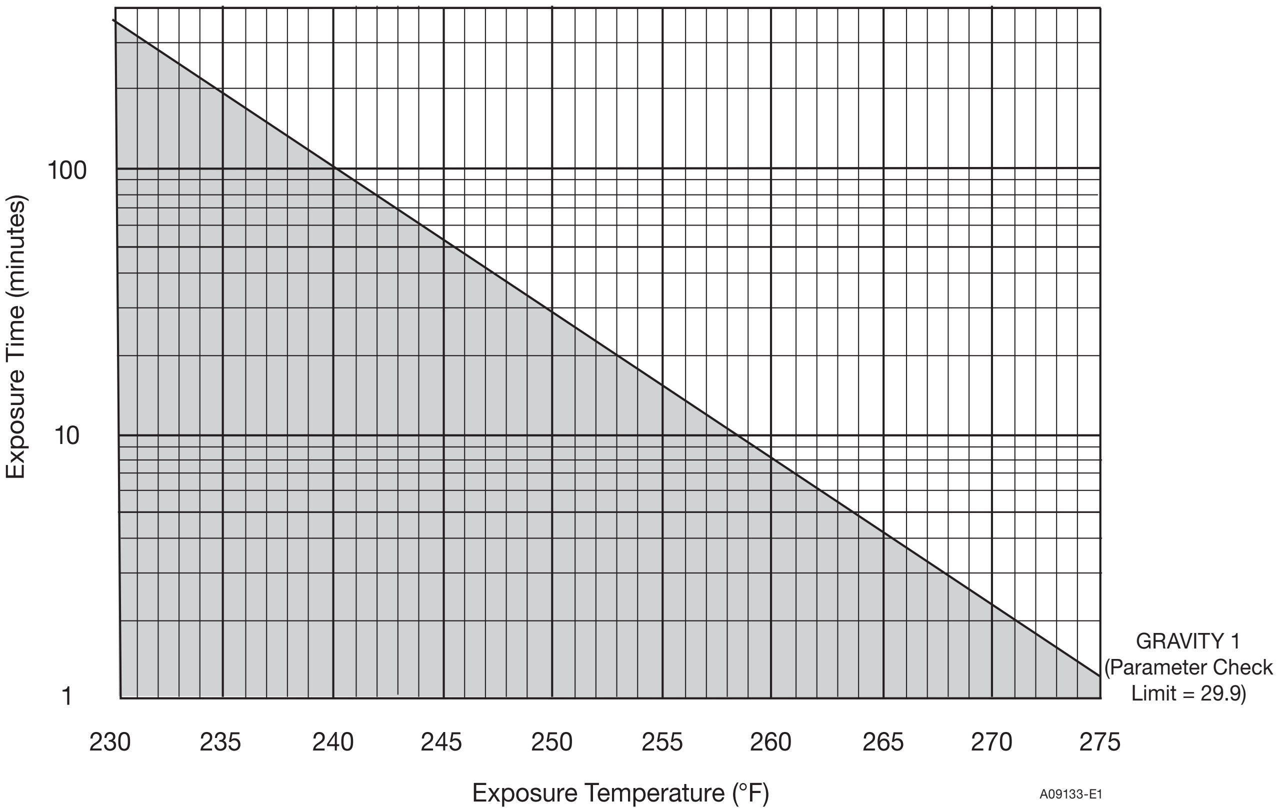


FIGURE D–4. GRAVITY 2 CYCLE

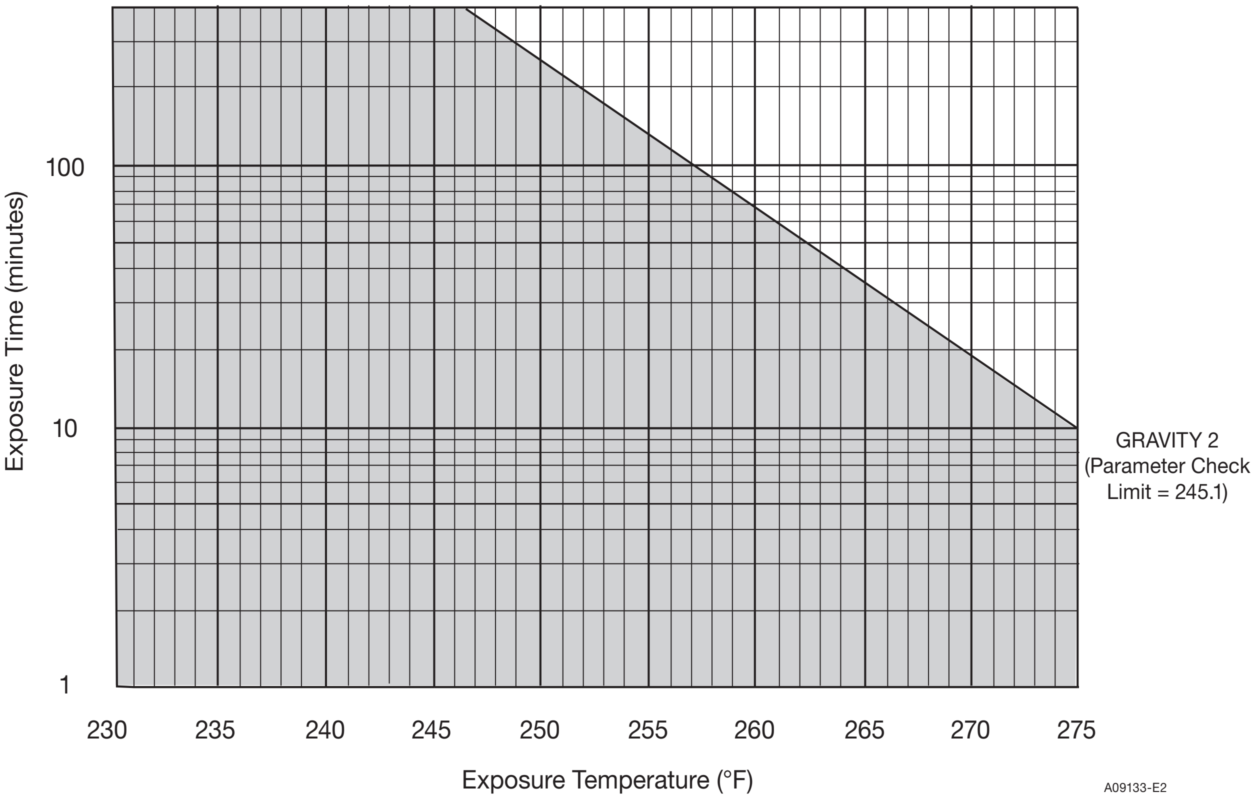


FIGURE D–5. FLASH 3+ CYCLE

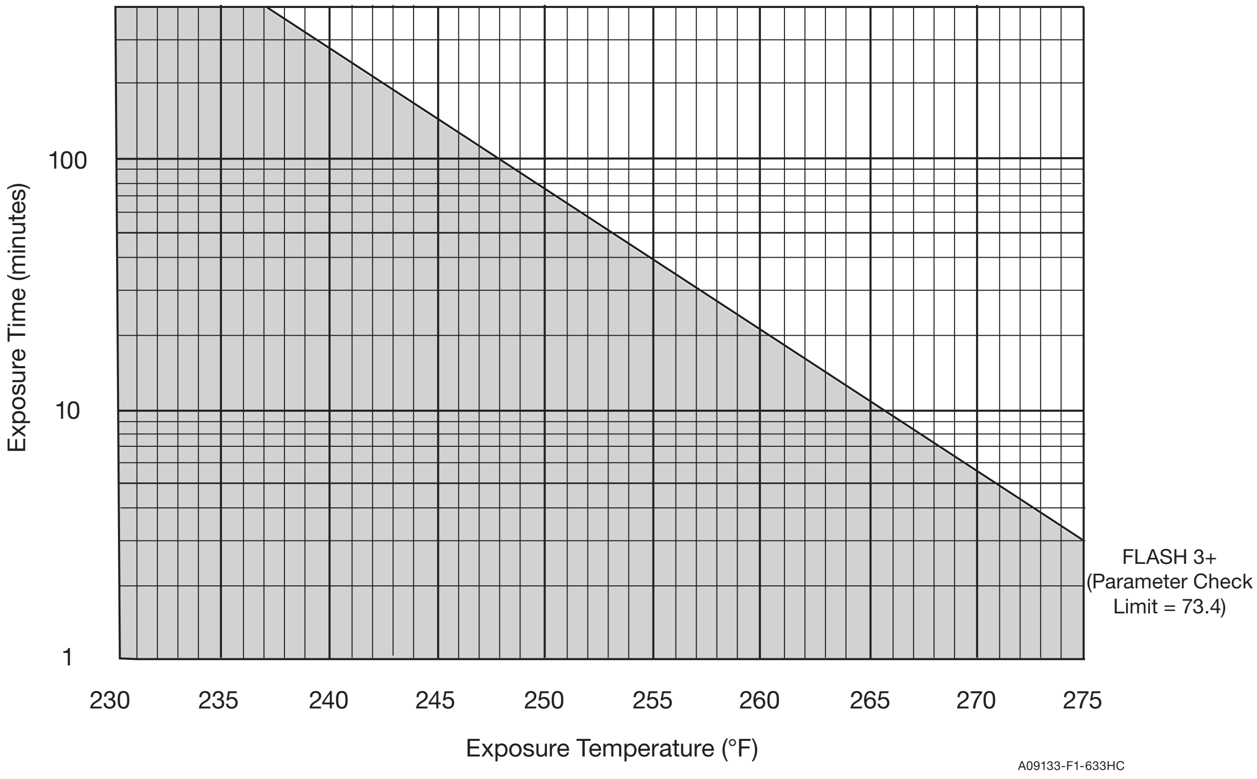


FIGURE D–6. FLASH 10+ CYCLE

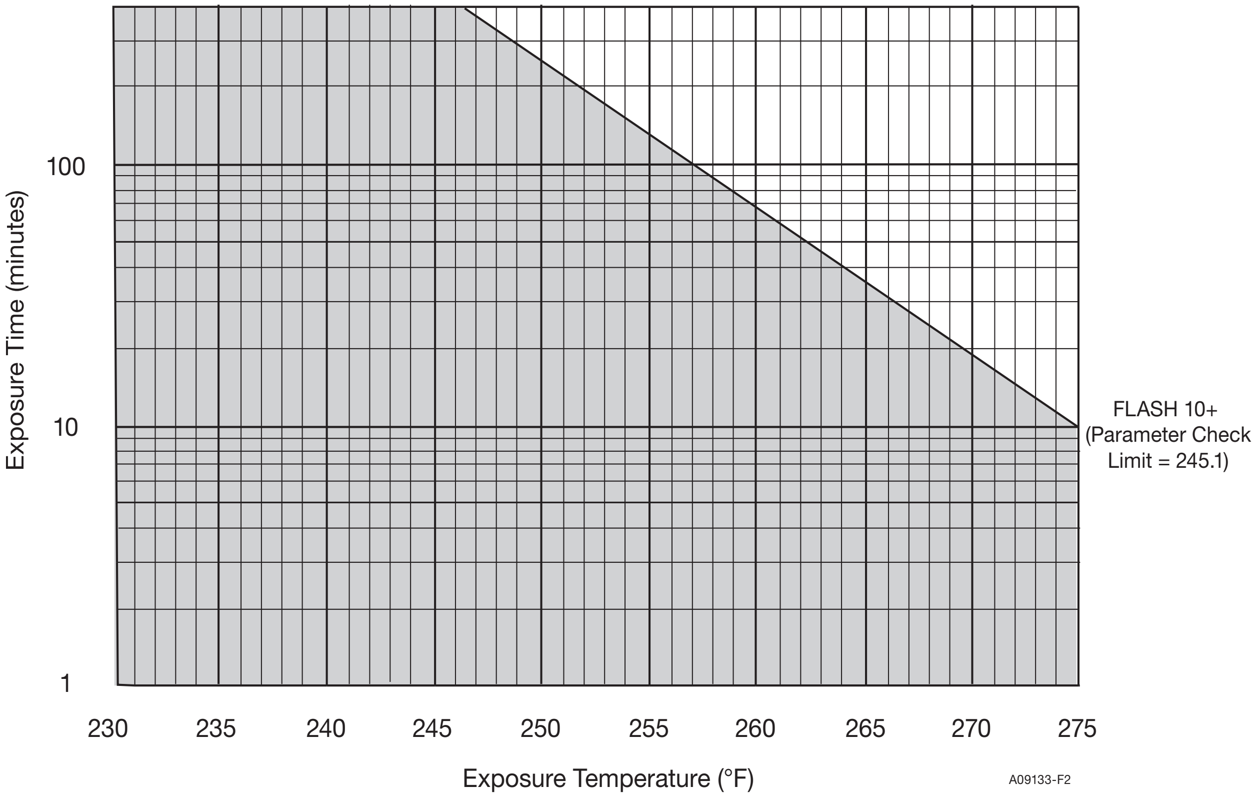
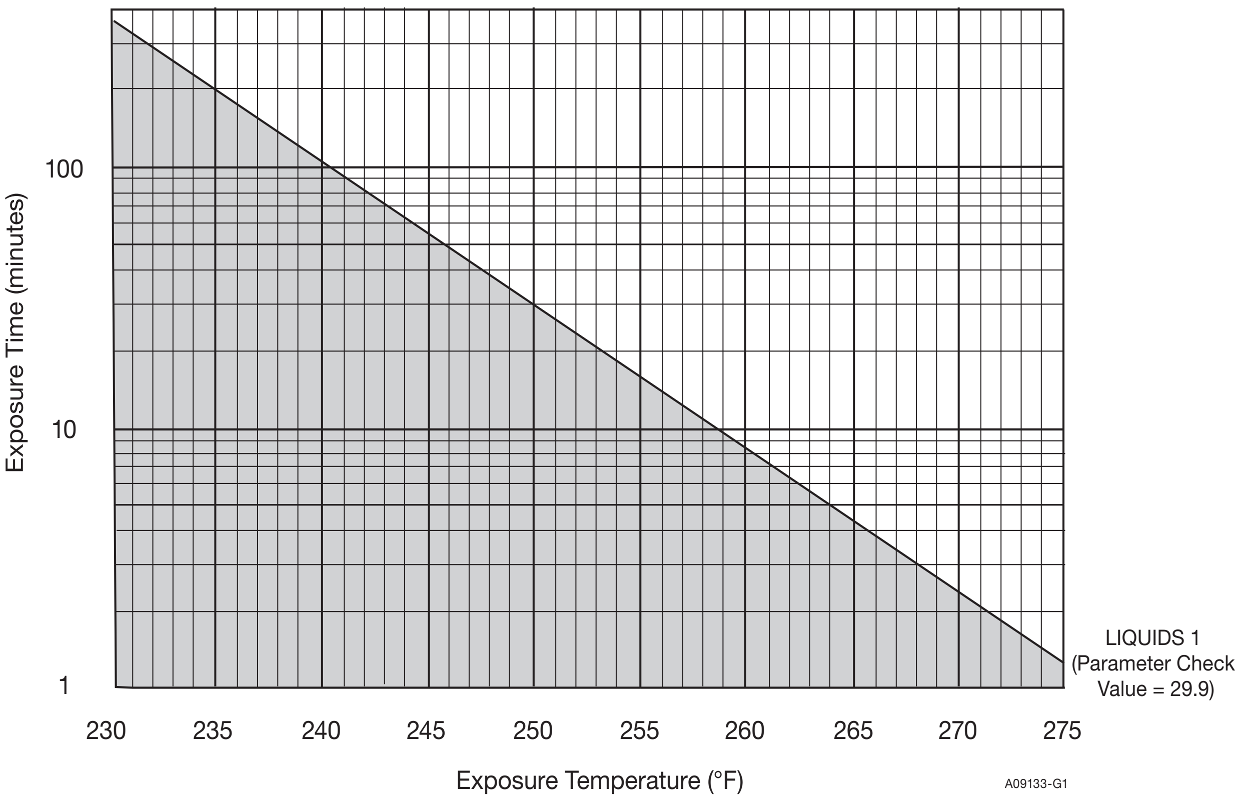


FIGURE D–7. LIQUIDS 1 CYCLE



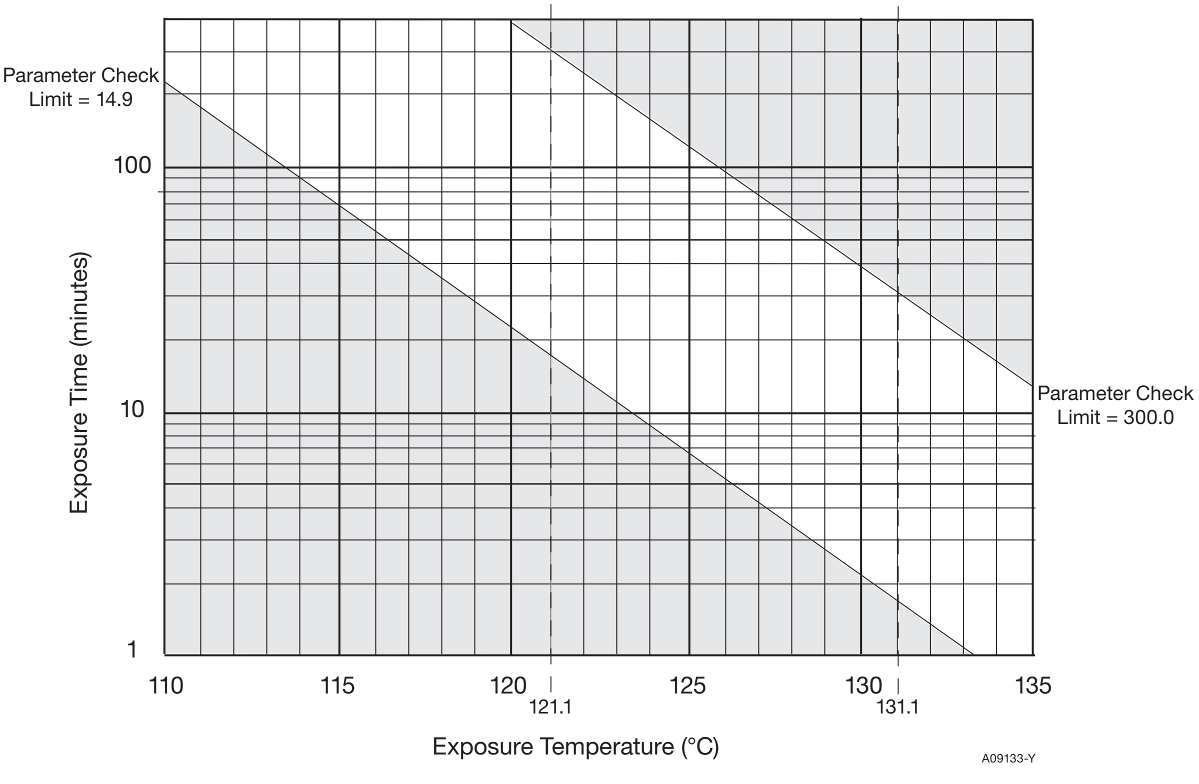
LS MODELS

☞ ***NOTE***
On LS models, the parameter check limit may be adjusted by a user with parameter setting access.

Because the parameter check limit for LS models is adjustable, the user needs to construct graphs for the specific parameter check limits. The parameter check value should be set to a value that is acceptable for all loads being processed with the selected cycle.

Since the parameter check function is linear when plotted on a logarithmic scale, only two points are needed to plot the line for a specific parameter check limit. The exposure times at 121.1°C and 131.1°C are convenient to use because the value at 131.1°C is always one-tenth the value at 121.1°C. On the graph below, exposure temperature is plotted on the x-axis and exposure time on the y-axis. Values outside the parameter check range (14.9 to 300.0) are indicated by shading.

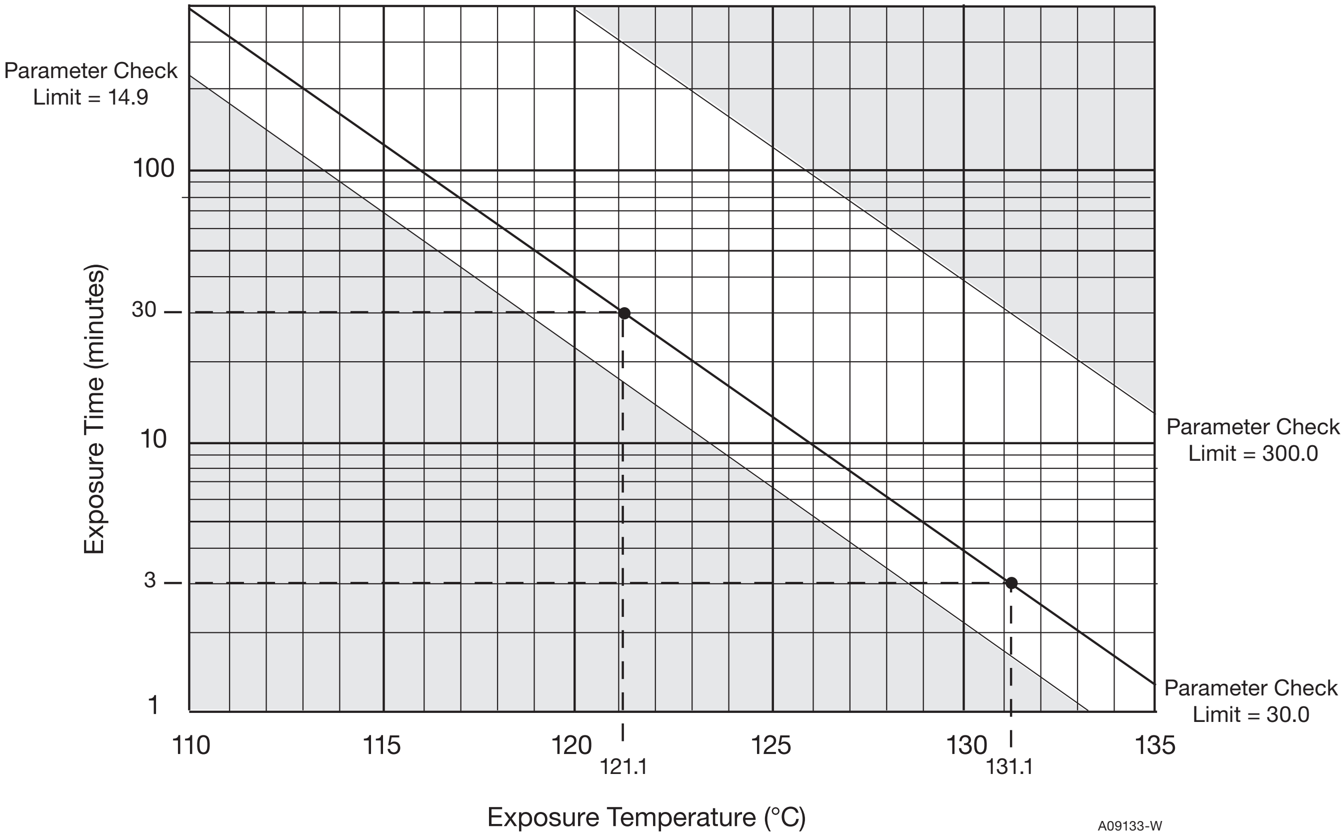
FIGURE D–8. PARAMETER CHECK WORKSHEET (LS MODELS)



PLOTTING A PARAMETER CHECK GRAPH

In the following example, a parameter check limit of 30.0 will be plotted.

FIGURE D–9. PARAMETER CHECK EXAMPLE (LS MODELS)



To plot a parameter check graph:

1. Select a parameter check value within the allowed range.

   In this example, the parameter check value is 30.0.

2. Locate the parameter check value on the y-axis (exposure time).

3. Mark the point where the parameter check value intersects 121.1°C on the x-axis (exposure temperature).

4. Divide the parameter check value by 10.

   In the example, the divided parameter check value is 3.0.

5. Mark the point where the divided parameter check value intersects 131.1°C.

6. Draw a straight line that runs through both points.

   This line indicates the parameter check limit. Any value that is below the line results in a LOW CYCLE VALUES message.

7. After plotting the parameter check limit, use the graph to determine if a specific cycle setting is above the parameter check limit. See *“Estimating Valid Cycle Parameters” on page D–3*.

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